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TEACHERS' FARM SCHOOL.

STATE RESEARCH FARM, WERRIBEE.

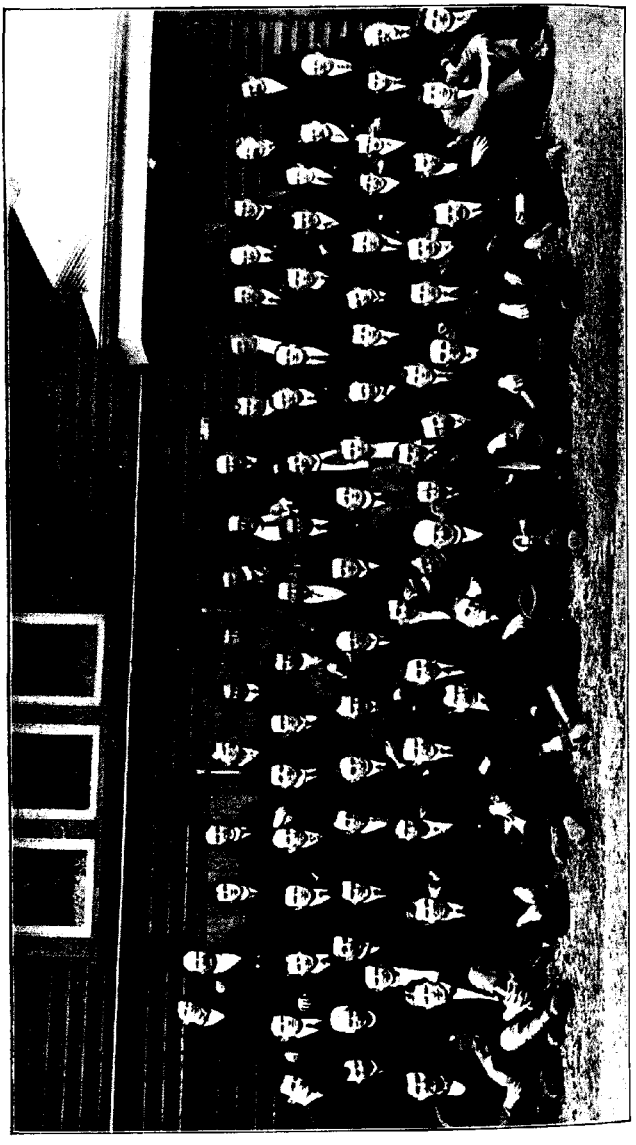
September 20th-24th.

It is an old and true saying that "There is nothing new under the sun," and yet the policy of the Department of Agriculture in disseminating the latest in scientific agriculture and agricultural research to school teachers of the State blazes a new track.

Since the installation of the Research Farm at Werribee, the Department has thoughtfully catered for the farming community in the matter of educating the farmer. In the past, the scheme was to arrange a farmers' excursion during Show Week, visitors being conducted by Dr. Cameron, Director of Agriculture, and staff over the farm. The Royal Show this year was abandoned, and consequently the farmers' field day could not be held. In lieu thereof, a programme of lectures and demonstrations for those State school teachers who included agriculture in their curriculum was arranged by the Departments concerned.

On the occasion of the annual field day, representative farmers from all parts of Victoria had the opportunity of viewing experiments associated with the cultivation of the main cereal and fodder crops, the breeding of wheat, the cultivation of lucerne, and other agricultural problems. The details of every separate experiment were explained to them. The objective was that the lessons learned there would be spread broadcast in various districts. The work of the farm, which is essentially and directly an institution devoted to scientific agriculture, would become known and utilized by the particular part of the community in whose interests everything is being done.

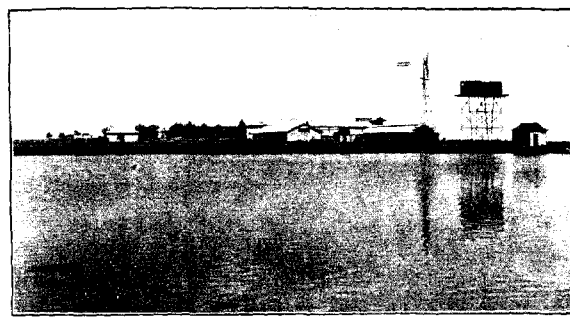
This year's innovation, in a manner of speaking, hits much nearer home. The position of the local schoolmaster is not generally one to be envied, especially in rural districts. His services are in frequent



Group of Teachers attending the Farm School, State Research Farm, Werribee, September, 1915.

request for filling in census cards, making up income tax returns, advising on electoral matters, dealing with questions on law and finance, acting as arbitrator in disputes, and umpiring football and cricket matches; in fact, he is the encyclopædia of the district. In agriculture, he is often asked questions ranging from the correct method of telling a horse's age to the percentage of flour a given wheat will produce. It is an old saying to "teach a yard you must know a mile"; hence it follows that a successful tutor in agriculture must possess more than a passing knowledge of the various mechanical arts and applied sciences which are attendant upon modern agriculture. He must also have a keen grip of practical agriculture. A day spent at the School of Agriculture during the course of the five days' instruction helps one to understand the value of the lectures and demonstrations given.

Upwards of seventy school teachers took advantage of the arrangements made by the Departments of Agriculture and Education. The school, which, by the way, was not run under union principles, as lectures and practical demonstrations in the field were held daily and



View of Farm Buildings, with Water Storage in the Foreground.

continuously from 9 a.m. to 10 p.m., with meal adjournments, was installed in the Werribee Research Farm buildings, and opened officially on Monday, 20th September. The large machinery-shed was turned into comfortable dormitories with novel, serviceable yet cheap conveniences. The dining-room was situated in a large and airy storeroom under the lecture room in the laboratory building.

The meals were of the first-class order, and the tariff very reasonable.

Formal Opening.

On Monday afternoon, the school was formally opened by Dr. S. S. Cameron, Director of Agriculture, and addresses were given by Mr. W. Cattanach, Chairman of the State Rivers and Water Supply Commission; Dr. Cherry, Professor of Agriculture at the Melbourne University; and Mr. Fussell, Chief Inspector of Schools. In the evening, addresses were given by Professor Osborne, on "The Human Body as an Engine," and the Hon. F. Hagelthorn, M.L.C., on "Agricultural Efficiency."

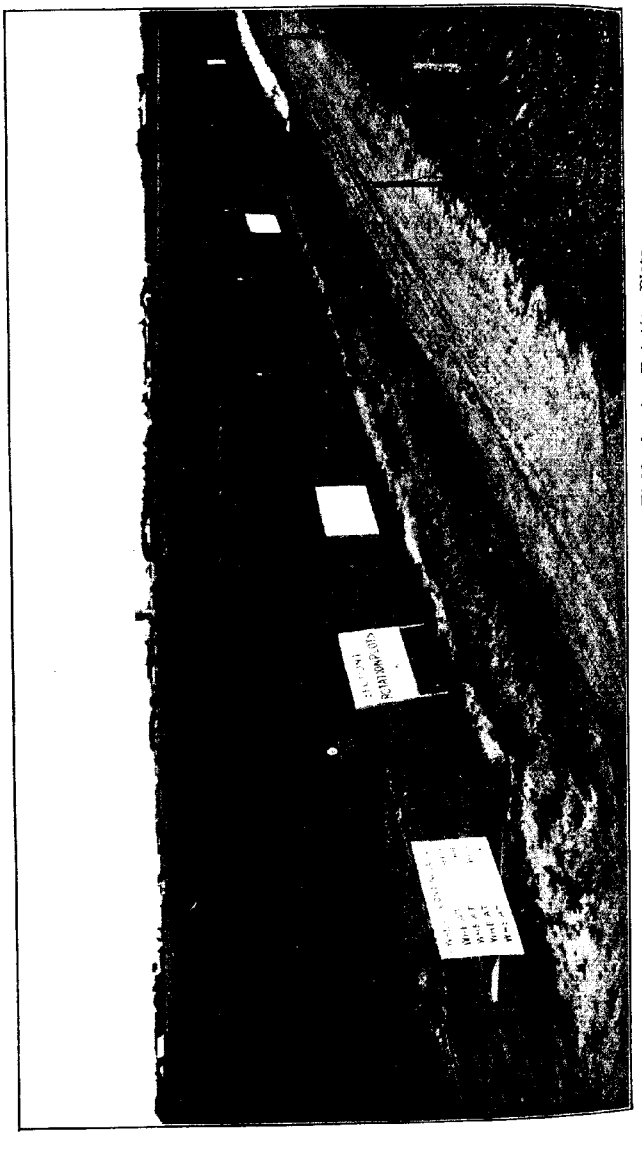
Opening Address.

Dr. S. S. Cameron, Director of Agriculture, in formally opening the school and welcoming the class, apologized for the absence of the Minister of Agriculture (Mr. Wm. Hutchinson, M.L.A.), and the Minister of Education (Mr. T. Livingston, M.L.A.), both of whom had intended to be present, but were detained at an important Cabinet meeting. He also regretted the absence of Mr. Frank Tate, Director of Education, who could have conveyed more properly, and infinitely more interestingly, the objects it was desired to achieve by the holding of these classes, and who, until his departure for Queensland on a well-earned holiday, had taken an earnest personal interest in arranging the course.

Although it was but natural that at the inauguration of this Teachers' Farm School a representative of the Education Department, in the person of Mr. Fussell (Chief Inspector), should be present to extend a word of welcome to those who were devoting their holiday to the acquirement of a wider range of knowledge, the presence of the Chairman of the Water Commission (Mr. W. Cattanach), and the Professor of Agriculture, in the Melbourne University (Dr. Cherry), had an important significance. Each of the bodies thus represented had a profound interest in the progress of agriculture; each was concerned, though in somewhat different ways, with the advancement of agriculture, and each owed a duty to the State to promote and push with the fullest energy and by every means in their power the betterment of agricultural methods, to the end of an increased and more profitable output from the fair lands of Victoria. It was plain that such objects would be best attained by the bodies concerned acting in unison. Such unison had not been too conspicuous in the past, but in connexion with this effort to assist agricultural education there was manifestation of cordial collaboration and co-operation of the State Departments of Education and Agriculture, and also of the hearty good-will and personal interest of the University and the Water Commissioners.

It was well known that the agricultural educational work carried out in Victoria had been somewhat disjointed. There were some who said that as yet it had been inarticulate, *i.e.*, it had not spoken. While that idea might be properly challenged, it could be agreed that the agricultural educational efforts had been non-articulating in the sense that they had not fitted in and worked smoothly together. Theoretically the apparent scheme was a good one. It provided firstly, elementary agricultural education in upwards of 500 of the primary schools: secondly, more advanced work in the twelve Agricultural High Schools: thirdly, a three-years' diploma course devoted solely to agriculture in the agricultural colleges at Dookie and Longerenong; and finally, a full university course for a science degree in agriculture. All these were designed to educate the youth of the community, and, in addition, the Department of Agriculture undertook, per medium of district farmers' classes, lectures and demonstrations, the instruction of the farmers of the State. Such a scheme appeared to offer the opportunity of stepping stage by stage from the preliminary grounding given to the schoolboy to a university graduation in agricultural science; yet, so far, there was no instance of such a career having been passed through. The experience here as elsewhere showed that efforts to promote agricultural education among fully-fledged farmers was only occasionally successful.

The minds of grown men who had for some years been engaged in practical farming became too inflexible. They had the handicap of having to unlearn a great deal before they could appreciate the soundness of modern investigations and science teachings. The most hopeful direction, therefore, in which the promulgation of scientific methods of agricultural practice could be effected was through the young unprejudiced mind of boyhood and youth. It followed then that success in attaining to the improved agriculture which all recognised as possible and as essential to continued agrarian prosperity, primarily depended on the sound teaching of agriculture to the boys and youths in the school, college, and university. The need of such sound teaching was perhaps greater and the opportunities finer, here than elsewhere in the world. Many problems in agriculture were peculiar to Australia, on account of the limitations of rainfall, seasonal variations, and climatic differences compared with other countries. With increase of population and facilities for transport of produce and the consequential rising of land values, there was urgent necessity for a corresponding increase of effectiveness of acreage, more intensive farming must be practised, and the effectiveness as regards output of every acre of land must be increased. From our hated enemy, Germany, as from our valiant allies France and Belgium, the lesson of closer settlement based on prudential and scientific methods should be taught by the State and learned by its agriculturists. Germany was managing to feed and maintain from its own resources a population of 68,000,000, with the agriculture of 123,000,000 acres of land—a little more than twice the area of Victoria with only 1,500,000 people. Belgium was able to put an army of 400,000 in the field within a week, while all Australia took a year to get a quarter of that number ready. In both instances the result achieved might properly be attributed to intensive farming on lines ever governed and ever modified by scientific teaching. To approach the same efficiency here the Education and Agricultural Departments must weld their efforts. It had all along been considered desirable to bring the officers of each Department into harmonious touch, but, unfortunately, it had been found impossible for our officers to spare the time to visit the 500 odd schools of the State in which agriculture is taught. So Mr. Greenwood, of your Department, and Mr. Richardson, our Agricultural Superintendent, decided that as Mahomet could not go to the mountain they would try and bring the mountain to Mahomet, and between them they have devised this Teachers' Farm School, to be held at Werribee, whereby for one whole week the education officers should contact each other, should contact the Agricultural Department's officers, and should have the opportunity of taking lectures on the different phases of agriculture under circumstances which would allow the principles expounded in the lectures to be immediately demonstrated in the practices, investigations, and researches that are being carried out on the farm. It was firmly hoped that, despite the necessarily crowded character of the daily programme, the fullest attention would be given by the class in order that the success of the scheme, which all desired, might be achieved. If successful, the scheme would probably be developed into the holding of many such classes throughout the year, but devoted to specialization on the various distinct phases of agriculture such as dairying, cereal culture, fruit-growing, sheep husbandry, irrigation farming, and the like. Finally, it was hoped that any discomforts



General View of Permanent Experimental Field, showing Rotation Plots.

which were entailed in the hurriedly made domestic arrangements, which were decidedly of a picnic character, would be met in a cheery spirit, and that the impressions carried away after the week's work would be pleasant and lastingly beneficial.

Mr. Wm. Cattanach, Chairman of the State Rivers and Water Supply Commission, gave an interesting review of the water resources of Victoria, and referred to the paramount necessity of increasing the water storages and developing irrigated agriculture on sound lines. At the present time, some 250,000 acres were irrigated in Victoria, and a policy of steady development was being carried out, with a view of ultimately bringing an extra 500,000 acres under irrigation. This objective, however, could not be fully achieved until our rivers were properly harnessed and adequate storages built. The policy of the Commission was to develop these storages and conserve as much water as possible.

Crop of Peas on Green Manurial and Feeding-off Tests Plot.

The Sugarloaf Reservoir was in course of construction, and, when completed, would impound 320,000 acre-feet of water. The storage at Waranga Basin was being increased to impound 330,000 acre-feet. Other storages were contemplated under the Murray Waters Agreement, and it was anticipated that when the present and prospective requirements were met some 750,000 acres of land would be placed under irrigated culture. That would enable Victorian agriculture to be placed on a firm foundation; and, with the proper development of such a large irrigated area, Victoria would be able to achieve her agricultural destiny, *i.e.*, the support of a dense rural population at a high standard of living.

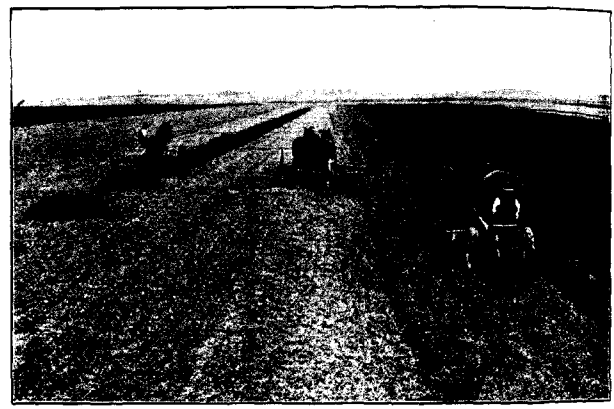
As an instance of what irrigation could do, the example of Mildura was cited. On an area of 12,000 acres, an inland community of 6,000 souls, enjoying a high standard of comfort, was maintained. The annual value of Mildura's products was no less than £450,000.

Adjacent to Mildura was the infant settlement of Merbein, which gave promise of excelling its foster parent in production and in wealth.

In the valley of the Murray, it was possible to have a dozen Milduras, all supporting a dense, contented, and prosperous population.

Dr. T. Cherry, Professor of Agriculture at the University, referred to the value of agricultural science to the teacher. The future prosperity of Victoria depended on the farmers being educated in the schools of to-day, and it was to them, rather than to the present generation of farmers, that we have to look for the consummation of our high destiny as an agricultural community.

He had, he said, an interesting confession to make. Three years ago he had opposed the establishment of the Research Farm at Werribee, as he believed that a site at Dandenong, where three different geological formations met, would be more suitable; but, in view of the results



View of Lucerne Field, showing Method of Harvesting Lucerne Hay.

obtained at Werribee, he had to admit that his early judgment was wrong.

The farm was one of the best equipped in the world, and was doing work of a character equal to any elsewhere. He had reached that conclusion from the comments made by the members of the British Association for the Advancement of Science, who visited the farm last year, and from his personal observation and reading.

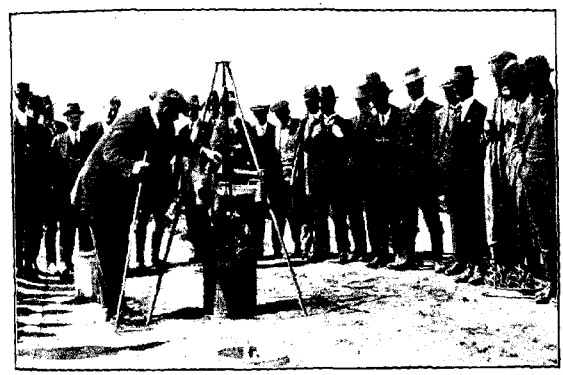
He looked upon the teachers of the High Schools and Primary Schools as an important factor in assisting the development of our agricultural resources, for they, more than any other section of the community, had the larger share in moulding the minds of the farmers of the future.

He was glad this school of agriculture was being held at Werribee, for the many-sided activities of the Research Farm—irrigated agriculture, dry farming, dairying, stock-breeding—would make a strong appeal to all those who are interested in agricultural advancement.

Extracts from a Student's Note-book.

The plan of instruction followed was to alternate lectures with practical demonstrations in the field, and to supplement this teaching with lantern slides. A short review of a student's note-book will disclose the scope of the instruction given. The first day's notes are divided into two headings—(1) How Crops Grow; (2) The Animals of the Farm.

Under the first heading, notes and rough sketches abound with information dealing with the life of the plant from germination to maturity, the method of growth being revealed by *microscopic* slides. The subject of soil fertility, and the problem of its maintenance, are set out in detail. The chemical, physical, and biological aspects of the problem are emphasized, and practical hints follow as the most approved methods of maintaining the productive power of the soil unimpaired.



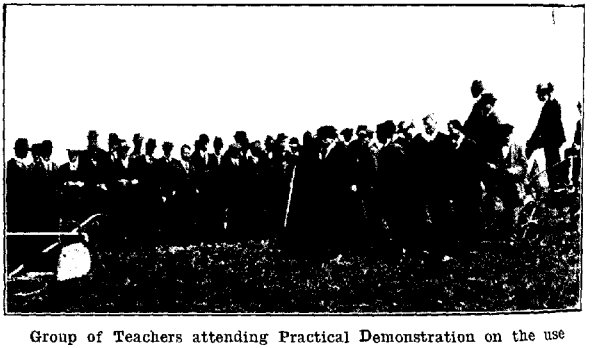
Mr. A. E. V. Richardson, M.A., B.Sc., Agricultural Superintendent, Demonstrating Method of Determining the Water Requirements of Farm Crops.

The second lecture, "Manures and Manuring," deals with the composition of the soil and the plant, the variations in soil types, their deficiencies in plant foods, and how these latter may be partly overcome by resorting to the use of artificial fertilizers. The composition of the various fertilizers on the market, the methods of manufacture, the control exercised by the administration of the Artificial Fertilizers Acts in eliminating fraud, are given, together with the mode of valuation of manures. A review of the current practice of applying artificial manures in Victoria, and the modifications demanded by varying soil and climatic conditions in the various parts of the State, complete the section on "How Crops Grow."

Under the second heading on "The Animals of the Farm" is to be found copious notes on the anatomy of farm animals, and the essential differences in the conformation of the good, bad, and indifferent types. The concluding lecture of the first afternoon on "Cattle Breeds and Management" provides notes on the history and characteristics of the

various breeds, and the absolute necessity for careful management. Particular stress was placed on the attention to and study of individuality. A page of the note-book is devoted to Professor Osborne's illustrated evening lecture on "The Human Body as an Engine." The notes show that we have yet a long way to go before the steam-engine approaches perfection, as the energy obtained from a given amount of fuel is only 18 per cent. of the possible maximum. The most perfect

Mr. H. C. Wilson, Farm Manager, Demonstrating Method of using Grading Implements.



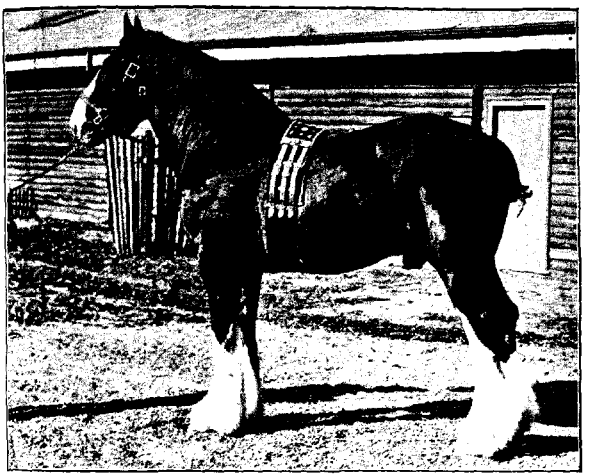
Group of Teachers attending Practical Demonstration on the use of Farm Implements.

of engines devised by human hands—the Diesel oil-engine—develop 45 to 50 per cent. Man, however, is able to generate over 50 per cent for his feeding.

Turning to the work of the second day, we again find the note divided under two headings (*a*) Dairying; (*b*) Fodder. Under dairying are complete and concise notes. All the points necessary for the maintenance and success of a modern dairy are enumerated. These includ

the selection of the herd, the testing of the cows, the culling of the beasts giving unprofitable returns, the attention requisite for proper management, the planning and building of a serviceable yet economical milking-shed, with its conveniences and environments, information on milking machines, and, above all, the absolute necessity for cleanliness. Judging from the volume of the notes taken, methinks the student is located in some district south of the Divide.

Under fodder, the notes are most interesting; the lecture was entitled "Foods and Feeding." Such an immense subject could not be fairly dealt with in one lecture of an hour's duration. The note-book shows that it was divided into two parts, and, for sake of convenience and the purposes of this article, the two sets are combined and treated as one. The science of economical feeding has been very much to the fore in



Clydesdale Stallion, "Major Oates."

recent years, and the careful manner in which the notes of this lecture were taken shows that the student is thoroughly acquainted with the fact. A list of the common foods—green, dry, and concentrated—their composition and value, are given. The theory of admixture to provide the balanced ration, the value of a chemical analysis in determining the various constituents, an explanation of the term nutritive ratio, the functions of the three main feeding units, and the method of calculating the unit value, are elaborated.

Pursuing the question of fodder still further, the notes from the third lecture give a description of the main grasses, both native and introduced. Methods of identification, suitability of soils and climate, interesting remarks on the habit of seeding, and various quaint peculiarities, render this lecture additionally valuable for nature-study and its object-lessons. The last, but by no means least, of the second day's proceedings deals with "Lucerne Culture." The student was fully alive to

the importance of this subject, for he heads his notes on this lecture, "The King of Fodder Plants—Alfalfa." The notes are voluminous, and practically tell all there is to be told of this valuable plant, including the type of soil most suitable for the growth of this legume, the preparation of soil, rate of seeding, varieties to sow, habit of growth, water requirements of the crop, the influence of irrigation, the essentials of success in lucerne culture, and the method of harvesting and curing hay.

The work of the third day is again divided into two headings, (*a*) Forage Crops; (*b*) Wheat and its Cultivation.

Under fodder crops are notes on the value of forage crops, both for fodder and the purposes of rotation. Information is given on the various forage crops grown in Victoria, varieties best suited for given districts, methods of treatment, yields per acre when grown under proper management, the composition and variation in feeding values.

Passing on, we come to notes on the subject of the second heading, namely, "Wheat and its Cultivation." Wheat is the raw material producing the staff of life, "our daily bread," and as turmoil and trouble exists in the greater part of the wheat world to-day, with a

Group of Clydesdale Mares.

consequent decline in production, this subject claimed more than usual attention. The notes are, in quantity and quality, sufficient to flatter the lecturer, as the student has not let the grass grow under his feet in availing himself of every opportunity for making notes on the information imparted.

The present position of the wheat industry in Australia, its possible future development, and the manner in which that development is to be brought about, were the main headings of this lecture. The notes indicate that future progress lies along two well-defined tracks, namely, increasing the acreage under cultivation through the winning of new lands to wheat-growing, and the raising of the average yield per acre. The latter is to be brought about by further improvements in agricultural machinery, the more extended use of fallowing, better working of the fallows, the adoption of systematic crop rotation, rational use of fertilizers, and careful seed selection.

In addition to the preceding notes are some on "Germ Life in the Dairy"; and in the main teach the lesson of cleanliness and sterilization as being the absolute essential of success.

The note-book on the fourth day is headed (*a*) Farm Animals and their Diseases; (*b*) Tree Planting; (*c*) Plant Breeding. The notes from the first lecture deal with "Sheep," and enumerate the various breeds, their characteristics, management, and usefulness. Mention is also made of cross-breeding for wool, mutton, and early lambs. The notes from the second lecture on this day have an amusing headline, "A Horse, a Horse, my Kingdom for a Horse!" from which it is inferred the student is not an ardent motorist. The essential points of the horse, the various breeds, breeding, and management are set down in due order.

Notes on "Tree Planting" next appear. Shelter and shade propagation, suitability for special purposes and places, are dealt with. The best trees to plant are those that nature provides for the locality. From the lecture on "Plant Breeding," we find profuse and detailed notes on the origin of new species, the nature of variation, and the effects of

Milking Time—View of Interior of Cowshed, showing Red Polled Cattle.

acclimatisation, selection, and hybridization on plants. The methods employed by the wheat-breeder in improving old varieties and creating new types is set out in detail, and the laws governing the inheritance of typical unit characters are indicated and illustrated by actual results obtained in the wheat-breeding investigations at the farm. No longer is the path of the wheat-breeder clouded with uncertainty and doubt. Equipped with full knowledge of the laws of inheritance acquired during the past decade, he may now go forward in his work of evolving new prolific types with a degree of certainty never hitherto enjoyed.

The evening illustrated lectures provide additional profuse notes on "The Contagious Diseases of Stock," and "Diseases Communicated by Milk."

The notes on the fifth and concluding session are subdivided into (*a*) Fungus Diseases; (*b*) Irrigation Methods; (*c*) Herd Testing. The notes

on the first lecture summarize the principal diseases that exact heavy toll from our cultivated crops, their cause, mode of dissemination and control. Such prevalent diseases as smut, rust, takeall, are dealt with in detail. The second lecture provides notes on irrigation methods, and sketches the extent of irrigation in other countries and the principal features of the irrigation systems of the old world. A survey of the water storages and irrigation areas of Australia, and explanations of the system of grading,

Another View of Cowshed Interior at Milking Time, showing Red Polled Cattle.

levelling, checking land are given, as well as the methods of applying water to varying types of the soil, and to various crops. The merits and limitations of the different systems of irrigation in vogue in Victoria are set out.

From the third lecture, "Herd Testing," we obtain notes giving information on the testing of dairy herds with a view of eliminating the "robber" cows, and raising the general standard of the herd. The scope, objectives, and methods adopted in the Government scheme of herd testing are discussed in detail.

Thus we come to the end of the student's lecture notes; but, on handing the book back, with congratulations to its owner, another book is produced. It is headed, "Demonstration Field Notes," and is almost

Group of Stud Suffolk Ewes and Lambs.

as great in volume as the preceding one. It is packed with information on actual farm practice. We find a rough sketch of the farm dairy, with remarks on the various cows, their milk yields, a brief description of the dairy laboratory and its fittings, and practical hints on the preparation and mixing of foods and feeding of cattle. A sketch illustrates the silos, mention being made of the value of ensilage and the factors which rule in successful silage-making, together with other practical points too numerous to mention. Then there are detailed notes of the manner of handling and examining a draught horse for soundness, and the factors which influence a good judge in determining the value and quality of a horse. A page is filled with short notes on age and dentition of sheep, calendar of operations on a sheep station, the distinguishing features of the various wool and mutton breeds, a descriptive account, accompanied by rough drawings of the various farm implements used in grading and preparation of the land for irrigation, the manner of putting up levee banks and applying irrigation water to lucerne and other forage crops.

A rough plan of the farm, with its subdividing roads and lanes, setting out the numerous fields, and including the permanent rotation, manurial, lucerne, and pasture trials, occupies a full page of the notebook. A note is also made

of the "Pot Enclosure," with its special experiment on the combined influence of lime and green manuring in rendering available the phosphoric acid of both natural and artificial phosphates. Mention is also made of the daily routine methods of measuring the temperature of the soil; calculating the hours of sunlight per diem, and estimating the amount of water which is daily evaporated from a known surface.

There is not one corner of the 1,000 acres which is not remarked upon, nor one experiment of the many hundred being conducted that has missed the eye of this painstaking student; and it follows indubitably that the information absorbed into this one brain will, in a space of a few years, be imparted to many young people—budding farmers, and wives of the farmers of the future.

The school teacher remarks during conversation of his former belief that the farmer and his family must, by the nature of his occupation, be deprived of reasonable leisure and luxury; that comfort did not enter into his life, which was reduced to the mere act of living, but his views had changed. His new opinion was that where such a life exists, it is the farmer's fault; the direct outcome of bad system and management, the result of careless and obsolete methods.

The condition of the State Research Farm, with its magnificent crops on the recognised poor and exhausted soil, had taught this school teacher the lesson of successful farm practice, and had so impressed him that he is already contemplating and planning the day when he forsakes the drudgery and unthankfulness of the Civil Service for a life of ease and comfort within the bounds of his own small farm, there to enjoy the pleasure of husbandry, and to find that the soil will not rebel against authority, but will give back with usury what it receives.

And so it should be assumed that the "Teachers' Farm School" of 1915, so successfully installed, and so splendidly brought to a conclusion, has served a twofold purpose, firstly, in disseminating, per medium of the schoolmaster, the latest in modern agriculture; and secondly, impressing the said schoolmaster with the knowledge that nothing can be more profitable, nothing more beautiful, than a well-cultivated farm.

Taking into consideration the status and popularity of the local schoolmaster, and his influence amongst the rising generation, does not this impression vie in importance with the value of the knowledge gleaned? I think so.

Visit to Werribee Irrigation Settlement and Werribee Park Estate.

Friday afternoon was given up to a lecture and demonstration on herd testing, and a visit to the Werribee Settlement.

The State Rivers and Water Supply Commission very kindly provided two large motor charabancs, and at 3 p.m. the party proceeded to inspect the young irrigation settlement.

The Werribee Estate, formerly a huge sheep run, was now to be seen cut up into small farms averaging from 40 to 50 acres, each commanded by water channels. The numerous settlers' homes, approximately a dozen families to each square mile of country, afforded a pleasing contrast to the old order of things, when far less than one family was supported on each square mile. Mr. Horsfield, of the Engineering Staff of the Water Commission, conducted the party round the settlement,

and gave informative discourses on the various phases of irrigation practice. During the course of the afternoon, a visit was paid to the Werribee Park Estate, where Mr. Chirnside personally conducted the visitors over the property. The exceptionally fine herd of Jersey cattle was inspected just prior to milking, and looked remarkably well.

The draught stock, and particularly the draught stallion Baron Bute, were much admired. A field of 30 acres with fairly steep contours was being prepared for irrigated lucerne, and this afforded an interesting opportunity for a short, practical demonstration on irrigation methods.

The Break-up.

Before breaking up, Mr. A. Eddy, Headmaster, Beeac State school, on behalf of the teachers, proposed a vote of thanks to Dr. Cameron and staff for the attention and many courtesies shown them during the week. He, and his fellow teachers, he stated, had spent on the Werribee Farm a most interesting, instructive, and enjoyable week. The visit had been a perfect eye-opener to them all. He wished to emphasize that this vote of thanks was not a mere formality, but a sincere expression of the feelings of them all. He could express nothing but admiration for the scientific manner in which all the various experiments in crop rotation, fertilization, wheat-breeding, irrigation, &c., were carried out; and they were certain that the results of the work inaugurated at Werribee would ultimately be of the very greatest value to the agricultural interests of the State.

They could not, of course, hope to carry out their experiments in the school plots on anything like the same scale, or with the thoroughness that was characteristic of the State Research Farm; but still they had, in the all-too-short week available to them, obtained such an insight into the scope and objective of agricultural research work as would enable them to go back to their schools with a fuller knowledge, and a far livelier appreciation, of the many problems involved in increasing Victoria's average annual out-turn in agricultural products.

Mr. A. E. V. Richardson, Agricultural Superintendent, in responding to the vote of thanks on behalf of the officers of the Department, said it was pleasing to know that, in the judgment of the teachers, the week's work had been a distinct success. It was, of course, very difficult to deal with any of the many subjects in anything but a cursory manner in the brief time available; consequently, the week had been spent entirely in dealing with the broad generalizations and principles underlying each subject.

It was intended, at a later date, to have special courses for the study of special subjects, *e.g.*, Wheat Cultivation, Dairying, Irrigation Farming, Fruit Culture, when more time could be given to the study of details.

The present course was intended to give a birdseye view, so to speak, of the agricultural problems confronting us in Victoria, and to stimulate an interest in the experimental investigation of these problems. Not the least valuable part of the week's work would be clearer knowledge gained by the full and free discussion of these problems among themselves. As far as the Department of Agriculture was concerned, the undertaking that week had been in the nature of an experiment, as it was the first time that such classes had been held in Victoria; but the keenness with which all the work had been followed, and the evident

appreciation exhibited that afternoon, would be a justification for organizing a more extended series of such classes in the near future.

LIST OF SUBJECTS AND DEMONSTRATORS.

A.—*Agriculture*—

1. Principles of Manuring.—A. E. V. Richardson, M.A., B.Sc., Agricultural Superintendent.
2. Wheat and its Cultivation.—A. E. V. Richardson, M.A., B.Sc., Agricultural Superintendent.
3. Plant Breeding.—A. E. V. Richardson, M.A., B.Sc., Agricultural Superintendent.
4. Irrigation Methods.—A. E. V. Richardson, M.A., B.Sc., Agricultural Superintendent.
5. Lucerne Culture.—A. E. V. Richardson, M.A., B.Sc., Agricultural Superintendent.
6. Experiment and Research Work.—A. E. V. Richardson, M.A., B.Sc., Agricultural Superintendent.
7. Soil Fertility and its Maintenance.—T. A. J. Smith, Chief Field Officer.
8. Forage Crops.—T. A. J. Smith, Chief Field Officer.
9. Farm Implements.—H. C. Wilson, Manager, State Research Farm, Werribee.
10. Irrigation (Demonstration).—H. C. Wilson, Manager, State Research Farm, Werribee.
11. Grasses—Native and Introduced.—G. H. Adcock, F.L.S., Principal, Viticultural Station, Rutherglen.
12. Tree Planting.—E. E. Pescott, F.L.S., Principal, School of Horticulture, Burnley.
13. Fungus Diseases of Farm Crops.—C. C. Brittlebank, Vegetable Pathologist.
14. The use of the Microscope (Demonstration).—C. C. Brittlebank, Vegetable Pathologist.
15. Management of Pastures.—G. S. Gordon, Field Officer, Werribee.

B.—*Animal Husbandry*—

1. Principles of Breeding.—S. S. Cameron, M.R.C.V.S., D.V.Sc., Director of Agriculture.
2. Horse—Breeds and Management.—S. S. Cameron, M.R.C.V.S., D.V.Sc., Director of Agriculture.
3. Cattle—Breeds and Management.—S. S. Cameron, M.R.C.V.S., D.V.Sc., Director of Agriculture.
4. Outlines of Anatomy and Physiology of Animals.—W. A. N. Robertson, B.V.Sc., Chief Veterinary Officer.
5. Diseases Communicable by Milk.—W. A. N. Robertson, B.V.Sc., Chief Veterinary Officer.
6. Contagious Diseases of Stock.—W. A. N. Robertson, B.V.Sc., Chief Veterinary Officer.
7. Cattle—Breeds and Management.—W. A. N. Robertson, B.V.Sc., Chief Veterinary Officer.
8. Sheep—Breeds and Management.—H. C. Wilson, Manager, State Research Farm, Werribee.
9. Dairying.—R. T. Archer, Senior Dairy Inspector.
10. Herd Testing.—R. T. Archer, Senior Dairy Inspector.
11. Foods and Feeding (2).—B. A. Barr, Dairy Supervisor.
12. Germ Life in the Dairy.—B. A. Barr, Dairy Supervisor.
13. Foods and Feeding (Demonstration).—R. R. Kerr, Dairy Supervisor.

C.—*General*—

The Human Body as an Engine (Illustrated Lecture).—W. A. Osborne, D.Sc., Professor of Physiology, Melbourne University.

The following letter has been received by Dr. S. S. Cameron, Director of Agriculture:—

Education Office, Melbourne,
12th October, 1915.

School of Agriculture.

SIR,

I have the honour, by direction, to forward the accompanying report from Mr. J. P. McLennan, Warragul High School, in regard to the School of Agriculture, held recently at State Research Farm, Werribee.

I am at the same time to express satisfaction at the success of the school, and to thank you and your officers for providing such a profitable course of instruction.

This Department will be glad to co-operate in further schools of instruction in wheat and fruit growing areas of the State.

I have the honour to be, Sir,

Your obedient servant,

(Sgd.) A. FUSSELL,

pro Director.

School of Agriculture held at State Research Farm, Werribee, from 20th September to 24th September, 1915.

REPORT TO DIRECTOR OF EDUCATION.

By Mr. J. P. McLennan, Head Master, Agricultural High School, Warragul.

Domestic Arrangements.—The arrangements made by Mr. R. H. Greenwood, Inspector of Agriculture, in conjunction with the officers of the Department of Agriculture, were excellent; and general regret was felt at the unfortunate absence of Mr. Greenwood on account of illness.

The convenience and comfort of the students were provided for in every possible way, *e.g.*, special provision of lecture room, comfortable sleeping accommodation, shower baths, and sanitary accommodation. The catering, which was in the hands of Mr. Cumberland, was first-class.

Interest shown by Officers of Agricultural Department.—The greatest possible interest was taken in the work by the officers of the Department of Agriculture. The presence of Dr. S. S. Cameron, Director of Agriculture, during the week, and the active co-operation he took in the work were much appreciated by the teachers. Mr. A. E. V. Richardson, Superintendent of Agriculture, was untiring and unsparing in his efforts to make the week a successful one, and to this gentleman is largely due the undoubted success of the undertaking. These gentlemen were ably supported by Mr. Temple Smith, Chief Field Officer, Mr. H. C. Wilson, Farm Manager, and the other officers who contributed to the week's instruction.

The provision of microscopes and slides by Mr. Brittlebank, and text-books by Mr. Richardson, was much appreciated.

Syllabus of Work.—The matter contained in the lectures, which in all cases was supplemented by demonstrations in the field, was appreciated, and should benefit the teachers who had the privilege of

attending. The mere fact of spending a week on the State Research Farm under the guidance of experts was a liberal education in itself. The importance of field experiments, and the necessity of methodical arrangements and careful and accurate making and recording of observations, were clearly and emphatically demonstrated. The results of investigations being carried out on this farm will be of immense benefit to Victoria and Australia; many of them will prove of world-wide interest.

The experience gained at this, the first school for teachers undertaken by the Department of Agriculture, will be of value when preparing the syllabus of work on future occasions. I feel sure that the officers concerned will see the advisability of making modifications in some directions. It seemed to me that rather much was attempted to be done in such a short time. In some topics, *e.g.*, milk and its products, and composition of foods, the majority of the students had not the requisite knowledge of chemistry to fully appreciate the lectures, which, however, were well delivered, and at only a few hours' notice, by an officer who took the place of the one originally allotted to the task. Although very little chemistry is taught to children learning agriculture in elementary schools, I would urge the necessity of teachers gaining a sufficient knowledge of that science to enable them to understand clearly the composition of milk and its products, foods and feeding, and the principles of manuring.

Future Schools. The proposal of the Director of Agriculture and the Education Department to hold schools of instruction in special branches of agriculture is a good one. Wheat and irrigation farming might be combined in a school at such a locality as Shepparton, while dairy farming and the raising of fodder crops could be dealt with at schools in the Western District and Gippsland.

With the experience gained at Werribee, the proposed schools would prove valuable to the teachers in the districts concerned.

General.—The lectures and other entertainments given during the evenings were much appreciated. On Tuesday evening the possibilities of the home cinematograph as an aid to education were fully demonstrated. The visits paid to the school by the Honorable Mr. Hagelthorn, M.L.C., Dr. T. Cherry, the Professor of Agriculture in the Melbourne University, Mr. Wm. Cattanach, the Chairman of the State Rivers and Water Commission, and the Chief Officers and Inspectors of the Education Department showed the interest taken by those gentlemen in Agricultural Education, and were appreciated.

The importance of a closer co-operation between the various bodies concerned with agricultural education was emphasized by all who addressed the meetings.

The school was an undoubted success, and the experience gained by the teachers will stimulate them in this important branch of education.

(Sgd.) J. P. McLellan,
Agricultural High School, Warragul.

MILLING AND BAKING TESTS ON ARGENTINE AND WALLA WHEATS.

By P. R. Scott, Chemist for Agriculture, and F. G. B. Winslow, Departmental Miller.

Introduction.

The trying times experienced by the wheat-growers of this State culminated in a prolonged drought, with a shortage of available wheat for local requirements. It was found necessary, in order to meet local demands, to import shipments of wheat from overseas, and amongst the shipments so imported were cargoes brought in of Argentine wheat by the steamer *Baron Minto* and of Walla wheat by the *Strathendrick*.

Both of these wheats have a world-wide reputation for quality, and have been largely used in European and other countries for some years past, with more or less satisfactory results. The wet and stormy weather experienced during the ripening and harvesting operations of the Argentine wheat affected the quality and the general appearance of the bulk wheat. Consequently this wheat suffered by comparison with our own home-grown wheat.

Wheat grown in the Argentine Republic is generally known as "Plate." Of late years this has become a strong competitor in the world's wheat market. Up to the beginning of the last harvest, the surplus wheat for export from the Republic was estimated at approximately 144,000,000 bushels; unfortunately, weather conditions disastrous to the crop, intervened, and considerably reduced this surplus. Last season's crop, as far as quality is concerned, suffered in consequence, and the bulk samples contained, among other impurities, a fair percentage of sprouted grain.

The harvesting of the crop is generally finished towards the end of December; the new season's wheat can, therefore, be placed on the market about midway between the supplies from North America and Southern Asia. It may also interest the local grower to know that Australian wheat usually commands a higher price on the European market, and, although subject to fluctuation, our Australian-grown product holds its position, and usually fetches about 3s. per quarter more than the Plate, Walla coming about midway between these two (a quarter = 480 lbs. = 8 bushels).

Oregon or Walla Walla is wheat grown on the Pacific coast in the United States. This wheat was of a composite character, containing some varieties of good colour, size of berry, and general appearance; others were of poor colour, shotty or thin in berry. This wheat required similar treatment to the Argentine to obtain best results. Among the popular varieties of this wheat grown may be noted Little Club, a very popular variety at present; Galgalos, Propo; White Australian is rapidly becoming a favorite. Some of the varieties are somewhat similar in appearance and colour to the ordinary type of Australian wheat.

The sale of the Argentine wheat has caused considerable trouble owing to frequent disputes over the weight, &c., the reputation of the

wheat, in consequence, suffering. To rectify this, amended terms of contract for the sale and purchase of the Plate wheat has been agreed to, the principal features of the new order being:—The wheat to be bought on the basis of the natural weight as ascertained by the 20-litre scale, and that the following rate of allowances be given:—1¼ per cent. per lb. per bushel for the first 2-lbs. deficiency; 2 per cent. per lb. per bushel for the third and fourth; over that the allowances to be subject to arbitration.

As most of the varieties of wheat grown are not familiar to Australia, some of the more important varieties are the Rosafe, Baruso, and Barletta. The latter variety is one of the most extensively grown. Originally introduced from Italy, it has become popular owing largely to its inherent quality of standing well in the ear without shelling out after ripening, and its adaptability to local conditions. The grain is a medium-sized, dark-coloured, smooth grain, resembling somewhat Red Fife in appearance. Impurities were found in varying quantities in the Argentine wheat, and, consequently, there is a considerable loss in the cleaning and sifting processes prior to the milling. This loss is made up of screenings, chaff, oats, barley, dirt, and drake.

The bulk wheat of this State, in common with the other Australian States, has long been recognised as the easiest wheat to mill grown in the world, conditioning, breaking down, and dressing without any trouble. It is not surprising, therefore, to find that most of the Victorian mills are designed to deal with Australian-grown wheat. These plants are known throughout the trade as short-system ones, and do their work in a satisfactory manner. To obtain good returns from the Argentine and Walla wheat, a long-system plant is required, as these wheats are difficult to break down, and do not dress freely, requiring more roll surface and dressing machines to do good work. Even when using a long-system plant, the wheat should be of good quality for the mill to carry a full lead. If the grain is damaged or sprouted, the flow sheet should be cut down considerably, or the mill will have a number of chokes that will give unsatisfactory returns.

Using the short-system plant in grinding these wheats, the miller, to produce a flour up to the Victorian standard, should cut down his flow sheet from 5 to 10 per cent. (the amount depending on the plant) to have sufficient roll and dressing surface; if the grain is damaged or spoiled it will be necessary to take a higher percentage of the feed. Some millers, to get the average output of their plant, have altered their silks on the flour dressing machines by putting on coarser silks. Where this is done, the purifiers are overloaded, and the purification of the semolina and middlings is unsatisfactory. The middlings and semolina are therefore sent to the rolls, containing impurities, and the colour of the flour is damaged on account of these impurities being allowed to go to the flour bag. Flour of a good colour is much desired, and is one of the main points by which its relative value is judged to a large extent by the miller and baker. As the colour depends largely upon the mechanical composition of the flour, the poorer the milling process, the larger the adulteration with foreign particles, and the darker the colour of the flour. Using the most improved method of milling these wheats, it is questionable whether a flour could be produced of as good a colour as that obtained from Australian wheat.

The cargoes of the wheats imported were, with the exception of one small shipment, of fair milling quality.

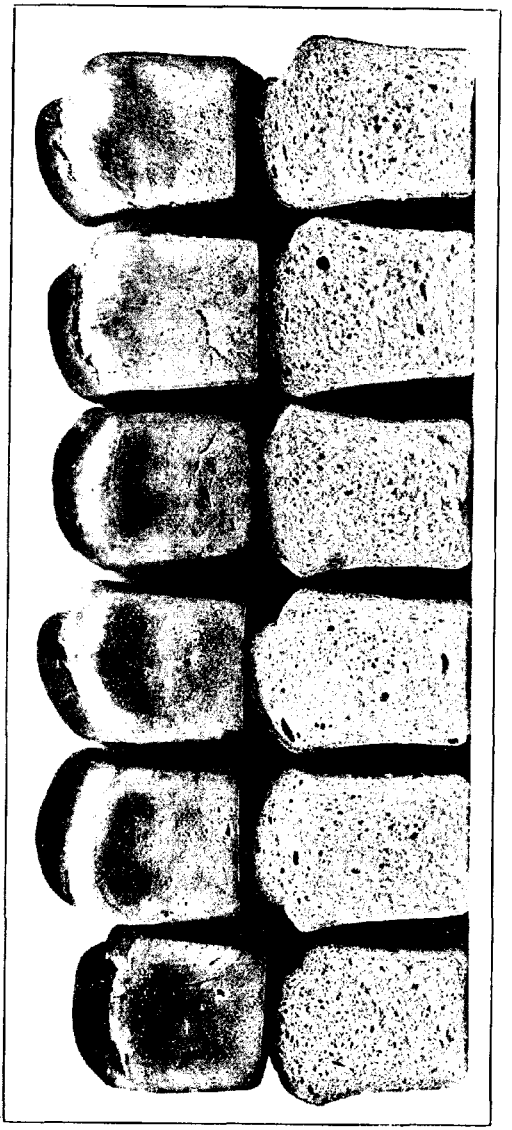
The flour produced was of good baking quality, fair colour, but lacking the rich bloom of Australian flour. Compared with Australian wheat, the bushel weight was slightly lower in both the uncleaned and the cleaned samples, the percentage of flour slightly higher, the gluten content was higher in the Argentine, and bran not so broad. The percentage of moisture in wheat is not without some practical importance, and should never exceed 13 per cent. in a good sample. It is, therefore, satisfactory to note that of all the shipments tested, the only one exceeding that percentage was the small shipment already referred to. A moisture content of 14.8 per cent. was found in this wheat, and probably accounted for the wheat grains being badly discoloured and sprouted; this wheat was, in consequence, of inferior quality, and would cause trouble to the miller.

Baking Quality.

The baking test furnishes the most reliable guide for judging the value of a flour, the baked bread is the one way by which one is able to judge a flour, taking into consideration its capacity to produce well-piled loaves of even texture in large quantity. Bakers desire a flour to which they can add a maximum amount of water, and still have a loaf that will rise well and present an even texture and good colour.

Average of Milling Tests of Wheats from Argentine, Oregon, and Victoria.

	Argentine.	Walla Walla.	Australian, F.A.Q., 1914-15.
Bushel weight, original sample ..	61 lbs.	61·4 lbs.	—
„ „ cleaned „ ..	63·2 lbs.	63·5 lbs.	62 lbs.
Moisture used in conditioning ..	3·0%	3·0%	3·0%
Break flour	7·9%	8·8%	8·2%
Flour	70·5%	69·7%	70·0%
Bran	17·2%	16·6%	18·0%
Pollard	12·4%	13·7%	12·0%
Moisture	11·47%	11·47%	11·43%
Protein in wheat	11·30%	9·30%	13·06%
Flour Tests.			
Protein	10·87%	8·37%	11·87%
Wet gluten	30·73%	24·96%	25·89%
Dry „	10·62%	8·33%	8·63%
Colour—max. 20	18	18	20
Quarts water to 200 lbs. flour ..	46·3 qts.	43·8 qts.	46·4 qts.
Baking Tests.			
Water used for doughing ..	196 ccs.	186 ccs.	195 ccs.
Weight of loaf	471 grms.	466 grms.	476.5 grms.
Volume of loaf	1,428 ccs.	1,435 ccs.	1,605 ccs.
Texture—points, 20 max. ..	17	18	18
Colour— „ „ „	17	17	18
Comparative Analysis.			
Bushel weight	98·3 points	99·0 points	100 points
Protein in wheat	88·0 „	71·2 „	100 „
Flour	100·7 „	99·5 „	100 „
Water absorption capacity ..	99·7 „	94·4 „	100 „
Volume of loaf	88·9 „	89·4 „	100 „
Total	475·6 points	453·5 points	500 points



Loaves Baked from Imported and Australian Wheats.

Walla Wheat. | Australian F.A.Q. | Australian F.A.Q. | Argentine Wheat. | Walla, 45. Argentine, 45. F.A.Q., 10. | Walla, 40. Argentine, 40. F.A.Q., 20.

In baking Argentine and Walla flour it was found necessary to give a longer proof than the Australian flour required. If the dough is taken too green, the bread has a coarse flavour, and the crust a foxy appearance. If given sufficient proof the bread has a good flavour, the crust still a slight foxy appearance. Walla flour requires to be made into a tight dough; when proving, the dough becomes soft and weak; the gluten is evidently of a poor quality. Blended with Australian or Argentine flour, the dough was strong and firm. When a small percentage of Australian flour alone was used, the loaf baked was of good quality; the colour, texture, volume, crumb, and general appearance satisfactory. Argentine wheat, when sound, is of good milling quality, producing a flour of medium strength, the gluten content being high, and the bread of a fair nutritious value. It is a good wheat for blending with other wheat. The chief drawback to the miller is the amount of foreign matter contained.

The Argentine wheat, composed of small, red grain, fairly soft, gave a broad bran and flour of fair colour.

Walla Walla was composed principally of small, plump, white grain, and a small percentage red grain; flour, soft and of fair colour. Australian f.a.q. was composed of large plump grain of good appearance, bran broad, and flour with good bloom.

The average composition, and the milling and baking qualities of these imported wheats, when compared with this season's f.a.q. sample, suffer by comparison. Neither of these wheats produced a flour equal in baking power to that obtained from the local wheat. While slight variation may be noted in the composition of the wheats, these differences may be partly accounted for by a variety of circumstances, such as difference of varieties grown, climatic conditions, and soils. The difference in the size of the grain was especially noted. Both these wheats were composed of smaller grains than the home-grown sample. The Argentine flour was highest in gluten content, and slightly higher in its water absorption power, while Walla flour contained a slightly smaller percentage of gluten and lower water absorption power than the local flour. The baking test of these flours produced a loaf of smaller volume, inferior in texture and colour, to that produced from the f.a.q. flour. Although inferior in quality in producing a well-piled loaf of an even texture, when compared with the f.a.q. flour the loaves baked from the flour milled from these wheats were of fair marketable quality, and would make a good substitute in times of emergency.

In order to test the capability of the flour for blending with Australian flour, a number of baking tests were made. The tests consisted of mixing varying proportions of Argentine and Walla flour and Australian in minor quantity. The loaves baked from two of the tests gave the following results:—

No. 1 Test—Argentine, 45;	Walla, 45;	Australian, 10.
No. 2 „ „ 40;	„ 40;	„ 20.
	No. 1.	No. 2.
Water used in doughing ..	190 ccs.	190 ccs.
Weight of loaf	470 grams.	472 grams.
Volume of loaf	1,580 ccs.	1,590 ccs.
Texture—points, 20 max. ..	18	20
Colour— „ „ „ ..	19	20

SUMMARY.

The Argentine and Walla wheat berries were smaller in size and darker in colour than the Australian wheat.

A comparatively high percentage of impurities was found in the bulk samples. A longer time and more attention were required to bring the wheat to an even temper for the breaks.

Much more difficult to mill than the local grown wheats owing to the proportion of hard wheats in the sample.

The flour produced was lacking in bloom when compared with the local flour. The dough required a longer time to prove, and lacked the power to produce as good all-round loaves as the local flour.

Good loaves were baked when blended with a moderate percentage of local flour.

(To be continued.)

WHAT MAKES MILK AND BUTTER YELLOW?

Recent experiments carried on by the United States Department of Agriculture have demonstrated that the rich yellow colour demanded by the public in dairy products is due to the character of the cow's feed.

The experiments were carried on in co-operation with the Missouri State Experiment Station. This question has been studied for many years by dairy experts. Their conclusion is that, although to some extent a breed characteristic, the intensity of the yellow colour may, within certain limits, be increased or diminished at will by changing the animal's rations.

Chemical tests show that the yellow pigment in milk consists of several well known pigments found in green plants. Of these the principal one is carotin, so called because it constitutes a large part of the colouring matter of carrots.

The other yellow pigments in the milk are known as xanthopyles. These are found in a number of plants including grass, but are especially abundant in yellow autumn leaves. These pigments pass directly from the feed into the milk. This explains the well-known fact that fresh green grass and carrots increase the yellowness of butter, the only standard by which the average person judges its richness.

On the other hand, a larger proportion of these pigments is deposited in the body fat and elsewhere in the cow. When the ration is changed to one containing fewer colouring constituents, this hoarded store is gradually drawn upon, and in consequence the yellowness of the milk does not decrease so rapidly as it otherwise would. This yellowness increases, however, the instant the necessary plant pigments are restored to the ration. Green grass is probably richer in carotin than any other dairy feed. Cows fed on it will, therefore, produce the highest coloured butter.

Green corn, in which xanthophyll constitutes the chief pigment, will also produce a highly-coloured product. On the other hand, a ration of bleached clover hay and yellow corn is practically devoid of yellow pigments, and the resultant milk from the cows fed upon it will gradually lose it colour. It is, of course, indisputably true that the breed does influence the colour of the milk fat, but vary the ration and there will be a corresponding variation in the colour of the milk fat in each breed. —[Extract from *Pure Products*, March, 1915.]

BEE-KEEPING IN VICTORIA.

By F. R. Beuhne, Government Apiculturist.

XXVI.—THE HONEY FLORA OF VICTORIA—*continued.*

(*Continued from page* 486.)

The Slender Mallee (*Eucalyptus calicogona, Syn. E. gracilis*).

(Fig. 35.)

A shrubby eucalypt forming together with the Giant Mallee (*E. incrassata*). The Hooked Mallee (*E. uncinata*), and the Oil Mallee (*E. oleosa*), the extensive Mallee Scrubs. Several stems usually spring from the one root, flowering occasionally at a height of 6 feet, but in the course of years rising to 25 feet. Bark silvery-grey or whitish. Leaves scattered, narrow lance-shaped or oblong linear, not very long, nor very uneven-sided, slightly curved, of equal colour and shining on both sides, veins hardly visible, not very spreading. Clusters of flowers singly at shoulders of leaves or some few endways, on thin stalks, with usually four to eight comparatively small flowers; buds lined lengthways with three to five angles; lid half-round or pyramid-shaped; fruits small, reversed conical, or somewhat urn-shaped, sometimes half egg-shaped, usually faintly angular, three or oftener four celled.

The Mallee Eucalypts vary considerably in the size and shape of leaves, buds, flowers, and fruits, the different species merging into one another so far as appearance goes, and it is therefore often difficult to identify variations. When more information is available as to the normal time and frequency of flowering and the length of time in bud of the various species, the apiarist will have an additional means of identification when in search of bee pasture.

Nothing distinctive in regard to the nectar and pollen production of the Slender Mallee is known at present.

The Oil Mallee (*Eucalyptus oleosa*).

(Fig. 36.)

As the name indicates, this is one of the shrubs from which eucalyptus oil is distilled, but notwithstanding there are several eucalypts yielding a larger amount (a table showing the amounts obtained from the different Victorian eucalypts will be published further on). The species under review form a large proportion of the Mallee Scrub (more or less intermixed with other vegetation), constituting tall bushes branched from the root on wide, particularly sandy tracts of arid inland depressions. In the ordinary bushy state it seldom exceeds 15 feet in height. The leaves are narrow or oblong, lance-shaped, pointed, slightly curved, of equal colour on both sides, often pale or grey-green, sometimes very shining and sometimes almost opaque; veins spreading very close together, very faint and often quite concealed; the oil glands are dark, very minute, and can only in young foliage be seen clear through the leaf. The clusters of flowers occur singly at shoulders of leaves or sideways on the branchlets on a slightly compressed stalk, bearing from

four to eleven pedicellate flowers; the buds are usually long pointed, but sometimes shorter and blunter, resembling those of the Hooked Mallee (*E. uncinata*), the leaves of the latter are, however, generally narrower. The fruits of the Oil Mallee are small, cylindrical egg-shaped, with the valve flaps narrow pointed, erect, and often remaining connected at the

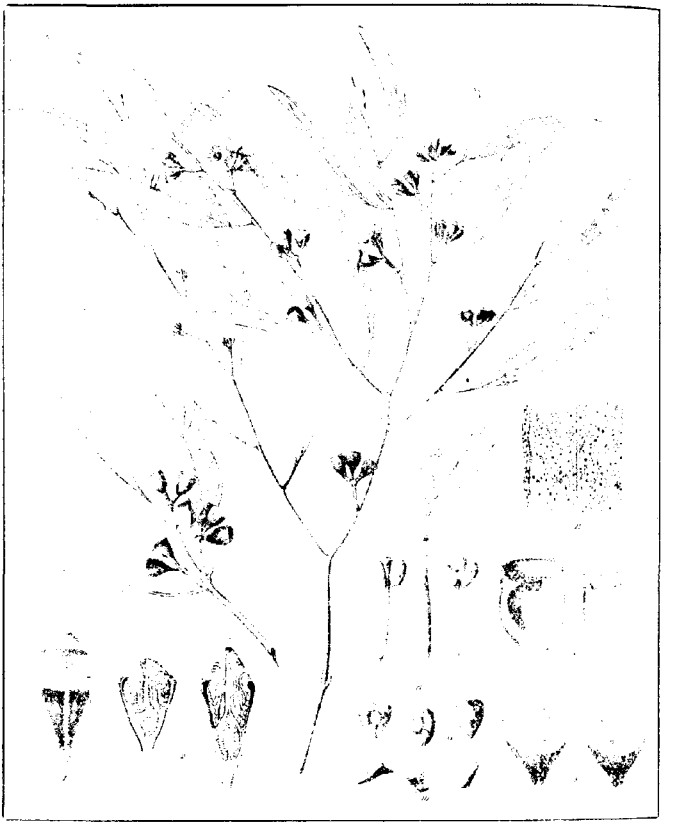


Fig. 35.—The Slender Mallee (*Eucalyptus caligogona* F.v.M. *syn. Euc. gracilis*).

points. Reference to the illustration, Fig. 36, shows that the fruits readily distinguish this species from others resembling it in leaf and other features.

The bark on aged plants gets corky but comes off in patches, while in younger plants it is smooth and pale. The porous horizontal roots,

like those of some other Mallee Eucalypts, when broken, give a supply of almost pure water, hence it is also known locally as Water Mallee.

As a nectar and pollen-producer, this species has not, so far, been isolated from others in the company of which it grows.

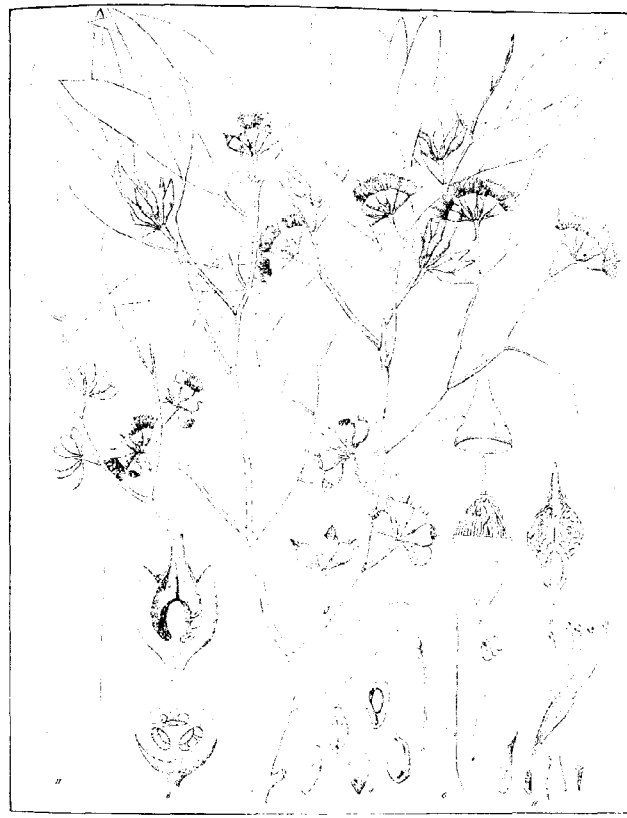


Fig. 36.—The Oil Mallee (*Eucalyptus oleosa* F.v.M.).

THE GIANT MALLEE (*Eucalyptus incrassata*).

(Fig. 37c.)

A shrub usually of tall growth, with several stems from the same root, exceptionally rising to a tree up to 30 feet, but flowering already at a height of 4 feet. Bark smooth, outside of a whitish or reddish colour, persistent or shedding its outer layers; branchlets rather thick and rigid, not drooping. The leaves are almost evensided, ending in a

narrow-pointed curved end; ovate or narrow lance-shaped, thick, of equal and light colour, as well as shining on both sides; veins close and spreading at rather an acute angle, the marginal vein distant from the edge of the leaf. Umbels of from three to eight flowers at the shoulders

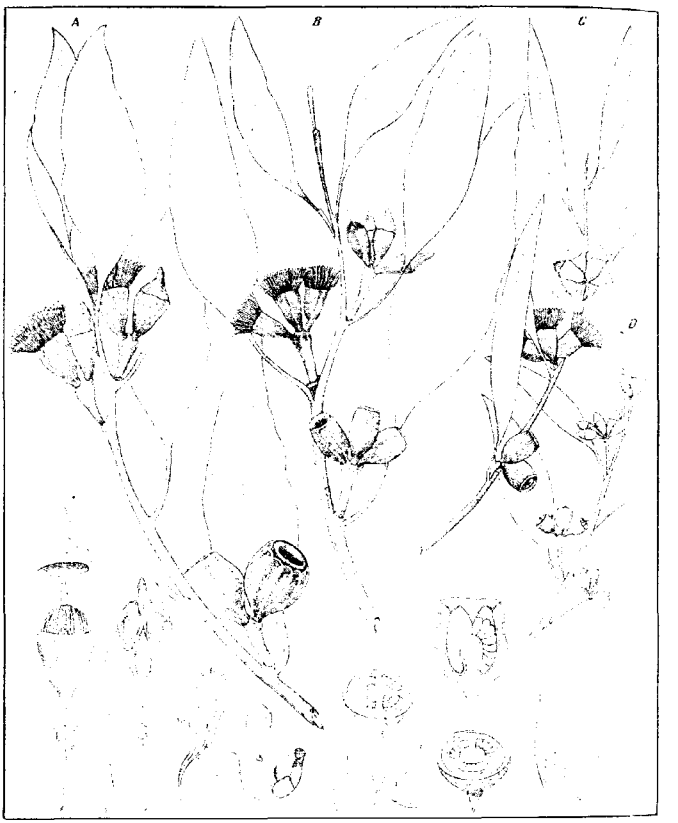


Fig. 37.—The Giant Mallee (*Eucalyptus incrassata* F.v.M.).

A. *Euc. incrassata*, var. angulosa.
B. *Euc. incrassata*, intermediate form.
C. *Euc. incrassata*, normal form.
D. *Euc. incrassata*, var. dumosa.

of leaves or sideways on the branchlets. The buds are shining, generally streaked lengthways, half-egg or somewhat bell-shaped, fruits half-egg or cylinder egg-shaped, more or less furrowed and streaked, three to four, rarely five celled. In regard to this species, it is difficult to give a

clear definition of the buds and fruits, as there are intermediate forms (Fig. 37B) between the species and its varieties (Figs. 37A and 37D), angulosa and dumosa respectively, and gradations connecting them.

The Giant Mallee is one of the prevailing species which, with its varieties and other species, constitute the dense mallee scrub, and play an important part in the natural economy of the desert, aiding to mitigate the excessive heat. The power of the roots of the Mallee Eucalypts to absorb humidity from the soil is very great; it is well known that several species, including this and the one previously described, will yield water from the roots.

The Giant or thick-leaved Mallee produces both nectar and pollen, but the quantity and quality of the former are yet unknown; it flowers in March and April, and is in bud for fifteen months, so that for some time two generations of buds are in sight.

ANGULAR GIANT MALLEE (*Eucalyptus incrassata, variety angulosa*).

(Fig. 37a.)

This is a large-fruited variety of the species described previously, from which it is distinguished by its larger and more angular and streaked buds and fruits, which are usually deeply furrowed, while the stalk of the cluster of flowers is thick, compressed, and upwards, much expanded, and the lid of the bud suddenly contracted into a slender point; the leaves also are somewhat broader than those of the other varieties, so that at first sight this variety is very distinct from the others (Fig. 37B, 37C, and 37D); as, however, there are gradations connecting the different forms, they cannot be looked upon as separate species.

What has been said of the species previously described in regard to nectar and pollen probably also applies to this variety.

THE SMALL GIANT MALLEE (*Eucalyptus incrassata, variety dumosa, Syn. Eucalyptus dumosa.*—A. Cunn.).

(Fig. 37d.)

This variety is classed as a distinct species by Baker and Smith, and described in their *Research on the Eucalypts* as follows:—Found in the interior, and rarely attains to tree form. The bark is white, persistent and smooth. Hence the local name "White Mallee." Leaves from oblong or almost ovate and obtuse to lance-shaped, under 4 inches long, short pointed, fleshy, shining, and of a dull yellow colour; venation fairly prominent, lateral veins distinct, marginal vein removed from the edge. Oil glands quite obscured. Clusters of flowers at shoulders of leaves, bearing a few flowers on short stalklets. Lower part of bud cylindrical, occasionally angular; lid of bud short conical."

This is a prominent Victorian Mallee, large tracts of country being marked on maps of the State as "dense scrubs of Eucalyptus dumosa." Unfortunately, so far, no information as to the suitability for honey production of these large unoccupied areas in the north-west and west are yet available; but, judging by the results obtained on the fringe of the Mallee, this class of country should afford great scope for apicultural enterprise, the Mallee flora being more of a nectar-yielding kind than that of moister districts, and the climate exceptionally suitable during the winter.

The Blue Mallee (*Eucalyptus polybractea*).

(Fig. 38.)

One of the shrub Eucalypts with bluish-green bloom on the foliage, hence the name Blue Mallee; the branchlets are angular, the leaves are

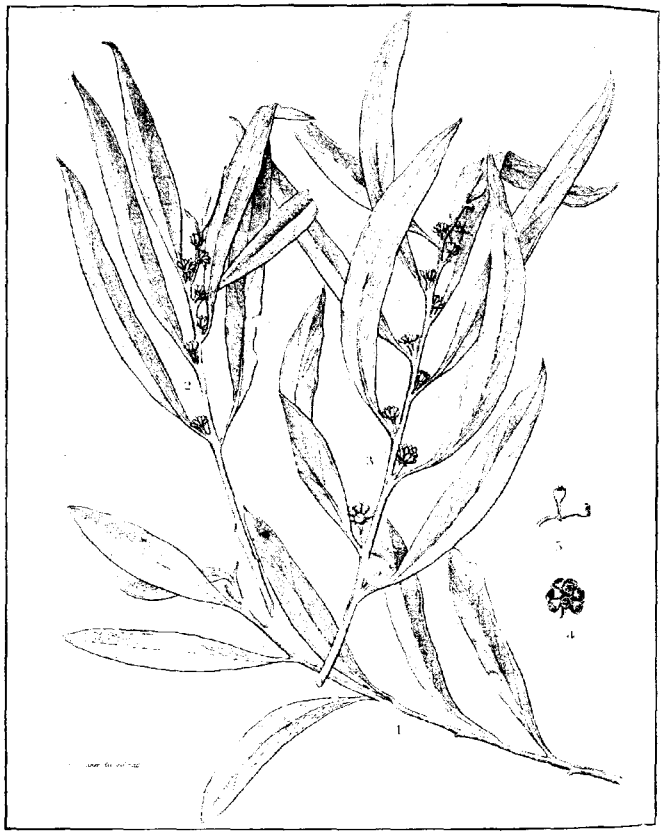


Fig. 38.—The Blue Mallee (*Eucalyptus polybractea* R. T. Baker).

(Illustration from "A Research on the Eucalypts, &c.," by Messrs. R. T. Baker and H. G. Smith.)

lance-shaped (those on the early shoots lance to long lance-shaped) erect, rarely unevensided, narrow, mostly 3 inches long, pointed often with the point curved backwards, not shining, the midrib raised on the underside, giving the leaf a strong resemblance to that of the olive.

The lateral veins are oblique, spreading, finely marked, only occasionally distinctly pronounced, the marginal vein removed from the edge. Oil glands very numerous. The flower clusters on short stalks at shoulders of leaves bearing from eight to twelve flowers; buds angular, with a frosted appearance in the early stages of development, and surrounded

Fig. 39.—The Green Mallee (*Eucalyptus viridio syn. acaciodes*).

by numerous pointed ribbed whitish bracts (small leafy appendages), from which distinguishing feature the botanical name "polybractea" is derived. The lower part of the bud tapers conically into a short stalklet, while the upper end or lid is blunt, or only very slightly pointed; fruit half-round to pear-shaped, and frosted in appearance.

The Blue Mallee differs from others in never attaining tree form; by the above-mentioned bracts surrounding the buds and their angular shape; by the leaves; the four-cornered branchlets and the whitish or bluish bloom which is characteristic of this species.

THE GREEN MALLEE (*Eucalyptus viridis, Syn. Eucalyptus acaciodes*).

(Fig. 39.)

A Mallee of dense growth, the stems usually 2 to 3 inches in diameter, though occasionally measuring 20 feet in height, it rarely grows to tree size. Bark smooth, or only rough at the base of the larger trees. Sucker leaves constantly narrower than normal leaves. Leaves erect, narrow, lance-shaped to almost linear, mostly 2 to 4 inches long, pointed or blunt-ended, not shining, but of a rich green colour, a feature from which both the vernacular and the botanical name is derived. The veins of the leaves are rather obscured, spreading, the marginal vein not far from the edge. Flower clusters at shoulders of leaves, bearing from seven to twelve flowers. Buds pear-shaped, with half-round, short-pointed lid; fruit pile-shaped, with a thin rim contracted at the edge.

The bark is of a fibrous nature, but not deeply furrowed, and of a peculiar rich yellow colour on the inner side. Timber dark and close grained, interlocked, yellowish-coloured. Being a Mallee, it is only rarely found in tree form, when it has a tendency to become hollow in the stem.

As in the case of the one previously described, no information can yet be given as to its habits of flowering and its value for honey production.

(To be continued.)

APPLE SYRUP—A NEW PRODUCT.

Following extensive experiments begun last spring, the head of the Fruit and Vegetable Utilization Laboratory of the Department of Agriculture (United States of America) has applied for a public service patent covering the making of a new form of table syrup from apple juice.

This patent will make the discovery, which the specialists believe will be of great value to all apple-growers as a means of utilizing their culls and excess apples, common property of any cider mill in the United States which wishes to manufacture and sell apple cider syrup.

The new syrup, one gallon of which is made from seven gallons of ordinary cider, is a clear ruby or amber-coloured syrup of about the consistency of cane and maple syrup.

Properly sterilized and put in sealed tins or bottles, it will keep indefinitely, and when opened will keep under household conditions as well as other syrups.

The syrup can be used for griddle cakes, cereals, household cookery, and as flavouring in desserts.

During the process of manufacture, which is described, calcium malate is produced as a by-product. This is sold for medicinal purposes at the rate of two dollars per pound.—[Extract from article in *Pure Products*, November, 1914.]

THE MAIZE-PRODUCING INDUSTRY IN VICTORIA.

By Temple A. J. Smith, Chief Field Officer.

(Continued from page 592.)

Drying or Curing.

After the maize is husked the cobs are dried out, either in cribs—sometimes called bins—made of saplings or sawn battens, 6 to 8 feet wide, and about 12 feet high. The floor should be at least 12 inches off the ground to allow of free circulation of air, and to prevent the soil moisture affecting the cobs. The saplings or battens should be from 1 to 2 inches apart, and it is advisable to line the whole with wire netting, particularly when parrots are numerous. Large cribs should have battens round the sides, to about half the height of the crib, to take the weight of the maize, otherwise the netting will bulge and break. Floors or lofts are often used, on which the cobs are emptied promiscuously to a depth of from 2 feet to 3 feet.

In the case of both cribs and sheds, a roof is necessary to keep out the rain—corrugated iron being the best material. The drying process takes two to three months, during which time a loss in weight of up to 20 per cent. takes place, due to evaporation of moisture. There is at the same time a considerable shrinkage owing to the same cause.

Threshing.

This is done, as a rule, in November and December; though, should good prices rule, the cobs can be threshed earlier. Maize, after being dried, will absorb moisture again to a small extent, and will, therefore, thresh better after a dry spell than following wet weather.

Threshers are made of different powers, from hand-shellers with a capacity of 10 to 15 bags a day to steam-power machines with a 200-bag capacity. The average cost of threshing by these machines is 4d. per bag. If maize is threshed before being properly dried, the grain will mould in the bags, and care should be taken to obviate such a condition.

Marketing.

This is a matter to which the Victorian grower might perhaps with profit apply some study. The history of our markets shows that maize has on many occasions fallen in price below its true feeding value. In 1904 the price was 2s. 4d.; 1905, 3s. 3d.; 1910, 2s. 11d.; 1911, 3s. 3d. per bushel. The maximum price was reached in 1902, when 4s. 10d. per bushel was obtained. On these figures, it is doubtful whether the maize-grower has been making as much profit as might have been the case had he fed the crop to pigs. No less than 60 per cent. of the maize grown in the United States of America is fed on the farm. This is a very large proportion, and the reason for such a condition of things must be that the practice of feeding is the most profitable. Ten per cent. is sold for feeding purposes to local buyers, and 25 per cent. goes into the general market. Only 3 per cent. is exported. Many experiments have been carried out in America to prove the value of maize

for feed, the results of which show that, on an average, a little less than 6 lbs. of maize in the cob is sufficient to produce 1 lb. of pork. Taking maize at 3s. 6d. per bushel, the average price over ten years in Victoria is $\frac{3}{4}$d. per lb. On these figures, it takes maize to a value of 4d. to produce 1 lb. of pork worth the same amount; therefore, it would pay better to feed when pork is over 4d. per lb. than to sell as grain at less than 3s. 6d. per bushel; and pork averages more than 4d. per lb., ranging up to 7$\frac{1}{2}$d.—nearly double the average market value of the grain. Where maize-growing and dairying are combined on the farm, the skim milk fed with maize is increased in value. Maize fed in the cob gives almost as great feed value as maize meal, the difference in favour of meal failing to compensate for the cost of crushing and carting to and from the mill. The expenditure incurred in threshing is avoided, and also the carting to a market. This latter is a considerable item in many cases. The manure from the pigs also carries a certain value.

The effect of feeding a large proportion of the crop on the farm would also have some influence on the price of maize in the general market, regulating the supply for general requirements.

Growers should always endeavour to send a good, clean, bright sample of maize, of the colour and size needed. The colour at present in favour is a rich yellow with a tinge of red, and a deep, wedge-shaped, flat and large grain.

Good bags should be used, and these should be branded with the owner's intitials or special brand. Uniformity in all respects in a parcel of maize, or any other product, appears to exercise a special influence in favour of prices.

Maize Stalks.

In Victoria, little use of the stalks after the ears have been harvested has been made, beyond the fact that stock have been turned in to get what fodder-value they could. In America, large quantities of the stalks are shredded and made into stover, and used with other foods for stock; the system prevents waste, and provides the best means of utilizing the residue of the crop. A similar method in treating the stalks might be worthy of consideration by our local growers.

Apart from the question of waste as fodder, not enough importance is attached to the value of the stalks when ploughed in to supply the soil with humus. Quantities of stalks are cut and burned which should be worked into the land as manure. In this way, heavy, stiff soils are improved in being opened up, for, as the maize stalks rot, they drain the land and cause air passages to form, and render the soil more friable. Sandy soils deficient in humus receive a supply of this necessary constituent of all soils, equal, in some respects, to a dressing of farmyard manure. Probably, one reason why stalks have been burned or carted away in the past is due to the fact that they are difficult to plough under when 6 to 12 feet long; but nowadays, when machinery is available to cut them into short lengths, this objection is removed. The proper way to deal with stalks is to roll just to flatten them down in one direction, and then to cut the stalks into 6-in. to 12-in. lengths, with a heavily-weighted straight-disc implement or roller, on which heavy steel cutters are fixed. These short lengths

cover well and decompose quickly. Care should be taken to plough stalks in early, at least a couple of months before the sowing season, to give all coarse material time to rot—a process which takes place at a greater rate when the soil is moist. The work of rolling, cutting, and ploughing-under is certainly not greater than cutting, raking together, and burning-off.

Maize stalks can also be utilized in some cases for silage when the cobs have been harvested early, and before the frosts have killed the leaves. Where the stalks are on the dry side for this purpose, water is added through a sprinkler to provide the 80 per cent. of moisture required in silage. As a rule, however, the stalk is allowed to get too dry before the maize is harvested to allow of it making satisfactory silage.

The pith of the ear is also of value when ground with the grain, giving the meal better fattening qualities than the meal made from the grain alone. This is not so much due to its having a higher nutritive value, as to the fact that the pith mixed with the grain renders the meal lighter and more digestible.

Crushing machinery is made by Melbourne manufacturers which gives excellent results.

Diseases and Pests.

The maize crop is probably freer than any other from disease, and in Victoria particularly so, and such troubles as root-rot, flag-rust, and smut, are, with the exception of the last-mentioned, almost unknown.

In respect to smut, which is liable to make its appearance in the ear and the flower, the damage sustained up to the present time has been slight; this, however, is no reason for neglecting to take precautions in regard to its spreading. There is a risk, too, of great trouble in the matter of diseases and pests being at any time introduced with importations of maize from foreign countries; and, where any such cases occur, they should be at once reported to the Agricultural Department for investigation and treatment to prevent spreading.

Mr. D. McAlpine, formerly Victorian Government Pathologist, in his book on the *Smuts of Australia*, states that Head Smut of maize (*Sorosporium reilianum*) is the only smut of maize known in Australia, and it is spreading in districts where maize is largely grown. It attacks the cobs and tassels, and is usually confined to them, though it appears in exceptional cases on the upper leaves. The smut is enclosed at first in a pinkish membrane, which soon ruptures in order to allow the escape of the spores. It has probably been introduced from Europe.

The mode of infection has not been determined, but formalin and hot water treatments of the seed are ineffective, and probably it does not occur through the seeding.

The best means to prevent the spread of the trouble is to procure seed from pure sources and districts not affected. Should, however, smut be detected in the crop, all leaves, flowers, and cobs showing signs of the disease should be collected, as soon as noticed, in bags and burned carefully, bag and all.

A change of crop in the land used for a few years is also advisable. The spores of the disease being of short life, they can be starved out by such a method.

Moulds or Mildew.

The most common moulds found on maize are known as "Panicillum" and "Aspergillus," which make their appearance when the maize is allowed to become damp, either due to its green condition when harvested, or the admission of moisture from without. These diseases develop fast, and destroy the feeding value and seed value of the grain. Maize so infected is dangerous to feed to stock of any kind, including poultry. The only practical cure is to keep the maize dry and allow free circulation of air through the cobs. Leaving the cobs in the husk too long, particularly if they have been picked on the green side, is one of the most common causes. Where kiln-drying is possible, the trouble can be checked and cured by submitting the maize to heat, beginning at 80 degrees F., and carrying it slowly up to 120 degrees F.

Insect Pests.

Cut-worms, which attack the young plants soon after germination, are the greatest pest in Victoria so far as insects are concerned. They are usually worse on early-planted maize than on that sown later in the season. They feed at night, generally just below or at the surface of the soil.

The remedy for this pest lies in early and constant cultivation. Applications of lime in the autumn also have a good effect. They can also be killed in great numbers by sowing baits made of arsenic or Paris green 1 lb., bran 20 lbs., and sugar 2 lbs., mixed with water sufficient to form a mash which will not stick together, so that it will easily separate when spread over the affected field. It should be sown broadcast over the field after sun-down, so that it will not become dry, and is then greedily taken by the cut-worms.

Where insect pests, particularly applicable to growing maize, are consistently bad, a change of crop for a couple of years will have a beneficial effect.

Weevils, which attack the grain, are often a source of trouble, and are difficult to deal with.

Where the grain is stored in rooms, or other places that can be tightly closed, fumigation with carbon bisulphide is the best treatment—about 3 lbs. of the liquid being required for every 100 bushels of grain. Pour about ½ lb. of the carbon bisulphide into saucers, and place on the top of the bags, or soak a handful of cotton waste and place this also on top of the maize. The gas formed is heavier than air, and will penetrate all through the maize and destroy the weevil. No open light should be allowed to come near the fumes, as they are highly inflammable; and the room in which the carbon is used should be well ventilated after treatment, as it is dangerous to breathe air heavily charged with the gas. Twenty-four hours is sufficient time to keep the room closed to kill the weevil.

CONSERVE THE NATURAL PASTURE.

Stack Silage.

By G. H. F. Baker, Dairy Supervisor.

In such a bountiful season as this, every means that can be employed of saving the surplus growth of natural herbage and fodder on old cultivation paddocks to tide stock over leaner years should be adopted. One cheap and easy system of doing this is stack silage. By this expeditious method a great amount of green fodder can be conserved almost indefinitely without sacrifice of any of its succulence. If wild oats, trefoil, clovers, crowfoot, barley grass, kangaroo and other varieties of grasses, be treated in this way, a reserve of fodder is established which will undoubtedly be found welcome when the seasons again fail. This, in addition to value procured, is the most rational system of eradicating wild oats and other objectionable weeds, as it catches them before they shed their seed.

A stack of silage is built in the same way as a stack of hay. The necessary precautions to take are to guard against building the stack large in area and low in height, as a large amount of green material can be placed in a small area. Therefore, material sufficient to build a high stack is essential to success. As the necessary exclusion of air cannot be effected without pressure, loftiness in an ensilage stack is a virtue and will always pay for the additional trouble it entails. To insure this, the initial error of starting the stack too large should be avoided. Hay stack dimensions are of no value for silage stacks. In general practice, it is found that one-fourth the area of a ton of hay will hold a ton of silage.

During building, the stack should be weighted every night after ceasing work. This can be done by suspending weights on wires across the stack, or placing some weighty material on it. Finish off the stack in a suitable shape to resist the weather, and weight it to assist settling and exclusion of air.

Several devices for weighting stack silage have been tried, but none are so satisfactory as the dead weight on top. It is ever doing its duty and does not require any attention after being placed there. Logs, stones, sand, bricks or earth may be used for weighting. One good plan is to make a framework of heavy saplings. Lay these around the edges, cutting notches in them so that they will fit into each other where joined; then fill between them and all over the stack with earth. This device will do good work and give satisfaction.

To expedite the building of the stack to the necessary height, the three following labour-saving elevators have been successfully used:—

First method.—Is the swinging hay stacker, which is fully described and illustrated in the June, 1909, issue of the *Journal of Agriculture*.

Second method.—Is to attach blocks and tackle to a stout limb of a suitable tree sufficiently high to allow the stack to be carried to a fair height. By the aid of a horse the load can thus be elevated and deposited bodily on the stack. It is necessary to have a quiet staunch horse with some weight for the work; otherwise have a third block attached to the bottom of the tree to keep the draught low.

Material required—80 feet of 2-in. rope, 1 double block, 1 single block, 35 feet 1-in. rope—as net for each dray in use—it will be wise to have an extra net to prevent delay of drays at stack.

Third method.—Is to elevate the load with a horse by means of a pole to which a spar, pulley blocks, and rope have been attached. To do this it is necessary to procure a strong sapling 30 feet long by 10 inches at the butt and a spar 12 feet long by 7 inches at butt. Fasten the spar to the pole 10 feet from the top by means of a toe piece on the point of the spar which fits in a projecting hole of an "L" piece bolted to the pole, connect the top of spar to top of pole by a strong chain in such a manner that the spar or gaff can be turned so as to deliver the load at any part of the stock. Place a double block at the point of the gaff, a single block beneath junction of gaff and pole, and a single at the foot. Take one end of 140 feet of 2-in. rope and fasten to the bottom of the double block which is attached to the point of gaff, then thread the rope over one pulley wheel in an additional loose double block, then back through the fixed double block, back again through the loose double block, up again through the fixed double block and down to the single block at junction of gaff and pole, then on to the single block at foot of pole, make a loop in end of rope to attach a swingle-tree, which has a release clutch hinged in back. Now all is ready to hoist the elevator, first select the site for stack of silage and in the centre of easiest and most conveniently approached side of site sink three stout planks 4 feet long (2 feet in the ground and 2 feet out). Place the butt of pole against these posts, then fix three guy ropes to top of pole, take these ropes out in opposite directions and at equal distances apart, sink three short posts into ground, placing them at a sharp angle so that the ropes will not slip off when the pole is being raised. Wind the loose end of rope around these posts. Then by aid of two quiet horses or a crab-winch and two men at the guy ropes, lift the pole upright.

Before making use of horses to get the pole in an upright position it will be necessary to raise the top end of pole off the ground 10 feet. This can be done by hand with the aid of a pair of shear legs. The men at the right and left guy ropes will take in the slack and at the same time keep the pole going straight. Should the pole get too much of a list to either side, stop the horses and straighten pole, then off again till it is in position. Make secure by tightening up all guy ropes. When this is done everything is ready to elevate the fodder which can, by the aid of this elevator, be built to a height of 20 feet to the eave.

Material required for this elevator—

Strong sapling, 30 feet long, 10 inches diameter at butt.
Spar sapling, 12 feet long, 8 inches diameter at butt.
2 bolts for attaching chain on spar and pole.
1 chain 10 feet long.
1 L-piece with two bolts to bolt on pole.
1 toe-piece for gaff to fit in L-piece.
2 double blocks for 2-in. rope.
2 single blocks for 2-in. rope.
140 feet rope, 2-in.
3 guy ropes, 50 feet.
35 feet of 1-in. rope for each dray in use with an extra 35 feet as a spare net.

SULPHITING AND THE WAR.

By F. de Castella, Government Viticulturist.

M. L. Roos contributes an article to *le Progres Agricole,* of Montpellier (France), in which he warned wine-makers of the difficulty they would experience in obtaining supplies of bisulphite of potash for the then approaching vintage (the French vintage takes place in September and October).

Mr. Roos is familiar to Australian vine-growers, owing to the translation of his work, published by the Department of Agriculture some years ago, under the title of *Wine Making in Hot Climates.** The warning he has recently given to French cellar-managers applies with equal force to wine-makers in Australia. Hence a few extracts from his article will prove of interest.

In the first place, he points out the remarkable popularity which the process of sulphiting has attained. All that was claimed for it five years ago has been fully realized; so that the judicious use of sulphurous acid in wine-making can now be looked upon as a standard method.

> "Sulphiting has become a more or less general operation in the cellars of the Midi (South of France), and of Algeria. So far as bulk wines† are concerned, its effects are no longer discussed, and it may be affirmed that wines resulting from sulphited grapes are incomparably superior to others, from the triple stand-point of flavour, of colour, and of keeping power."

This emphatic recommendation from so competent an authority merits careful consideration by the few Australian growers who still hesitate to apply sulphiting.

Reprints of the articles describing the process, which have appeared in this *Journal*, are obtainable on application to the Department of Agriculture. In these it was pointed out that the most convenient source of sulphurous acid (SO_2) is the salt commonly known as bi-sulphite of potash, which is in reality a pyro sulphite ($K_2S_2O_5$). Prior to the outbreak of hostilities, this salt was imported from Germany by French as well as Australian wine-makers. Mr. Roos points out the difficulties vine-growers will have to face in the way of securing, not only bi-sulphite, but several of the other forms of SO_2.

> "The state of war has radically changed the conditions of production in the chemical industry, so that we will not be able to choose this year between the different forms of sulphurous acid. . . . . Sulphurous acid liquefied under pressure can scarcely be supplied by more than one French factory; its production will be much restricted, and quite incapable of meeting the demand caused by the total deficit of bi-sulphite . . . . the price of which . . . . has already more than doubled.
>
> Dissolved sulphurous acid—the acid of commerce, often known in Australia as S-ous—will be fairly scarce, as will also the complex phosphated sulphurous solutions which have succeeded in obtaining the preference of numerous vine-growers.

* Wine Making in Hot Climates.—L. Roos, translated by Dubois and Wilkinson. Obtainable from the Department of Agriculture, Melbourne, price 1s., postage, 5d.

† The cheaper wines grouped under the general term of "Vin ordinaire," which are the universal beverage in France, are handled in and consumed from bulk. It is only expensive wines which are able to support the heavy cost of bottling.

> Bi-sulphite of potash was almost wholly supplied to us by Germany. German importations being completely shut off by the war, there will be a shortage of some hundreds of tons of bi-sulphite of potash this year. French factories capable of turning out this substance have not been able to equip themselves for this manufacture soon enough, being prevented by the duties they have had to accomplish for the Army, or by other reasons. As a matter of fact, bi-sulphite to-day is non-existent, nor will it exist more plentifully by vintage time; so that very many vine-growers who were in the habit of using it must now think of replacing it."

Bi-sulphite of soda is next dealt with. In solution, it should be only bought subject to guaranteed SO_2 content. In the solid form, it is a product which continually liberates SO_2, hence its composition is very variable. As for crystallized sulphite of soda, it may be relied on to yield 25 per cent. (by weight) of SO_2, and the anhydrous sulphite 50 per cent., just as bi-sulphite of potash does.

The possibility of manufacturing one's own SO_2 by simply burning sulphur is next dealt with. Fortunately, sulphur does not come from Germany, hence a scarcity of this substance is not imminent. Mr. Roos points out how sulphur burning in air produces twice its weight of sulphurous acid. This substance is supplied in the shape of a gas, mixed with the nitrogen of the air which served to burn the sulphur. Admitting that the dose necessary for effectual sulphiting be 10 grammes per hectolitre of SO_2 (practically 1½ ozs. per 100 gallons), this would be supplied by ¾ oz. of sulphur; but there is difficulty in obtaining the absorption by the grape juice of the whole of the SO_2 produced by the combustion. Theoretically, it is possible to burn 3 ozs. of sulphur in 100 gallons of air, and in practice, about 2¼ ozs.; but it is necessary to burn this in the upper part of the cask, otherwise the sulphur will be extinguished by the SO_2 produced, which, being heavier than air, accumulates in the bottom of the cask. There are also difficulties in the way of getting sulphur to burn properly. Flowers of sulphur are very unsatisfactory in this respect. Bar sulphur is better, but melts and runs as it burns. Mr. Roos mentions a form of sulphur which does not run, recommended by M. Pelletant, of Beziers. This is a mixture of sulphur and starch containing only 2 or 3 per cent. of starch, enough though to provide the formation during combustion of a very porous charcoal which absorbs the melted sulphur. This is prepared by making a paste of powdered sulphur and starch water. This paste may be cut or moulded into any desired form, and then dried.

The next point is to secure the absorption by the grape juice of the whole of the SO_2 produced. In the ordinary way absorption is anything but complete, a good deal of the SO_2 being driven out through the bung-hole by the ingoing juice without being absorbed by it. Complete absorption can be secured by the use of special apparatus such as those figured on pp. 174 and 175 of *Wine Making in Warm Climates*. Even without recourse to these appliances, fairly complete absorption can be obtained by the simple expedient of fixing a small copper plate in front of the jet which delivers the wine into the cask; this is kept in place by two wires so as to constitute a sort of stirrup attachment. Such an arrangement causes the wine to fall into the cask in a fine shower, which absorbs the SO_2 so completely that the loss does not exceed 5 per cent.

Mr. Roos next points out how to turn this to practical account. Suppose one desires to sulphite at the rate of 12 grammes of bi-sulphite per hectolitre (nearly 2 ozs. per 100 gallons), a low dose, but sufficient for sound grapes; all that is necessary is to burn the sulphur at the rate of 1 oz. per 100 gallons in a cask one half the size of the vat to be filled. The juice is run out of the vat, pumped through the special jet into the cask containing the SO_2 resulting from the combustion of the sulphur, and thence back to the vat again. In other words, the must is sulphured in a separate cask and pumped back after it has been thus sulphited.

In conclusion, Mr. Roos points out that though it is easy to understand wine-makers' preference for bi-sulphite, in spite of the lack of this substance, wine-makers can still sulphite their vintage at the cost of a little extra trouble by means of SO_2 resulting from the combustion of sulphur.

Those wine-makers who have not yet secured supplies of bi-sulphite have thus other means of sulphiting their wines even if this salt should be unobtainable. It is interesting to find the Soda Salt recommended by Mr. Roos. No objection can be logically raised to its use; since the outbreak of war prominent authorities in Great Britain urge that Sodium Salts should replace the corresponding Potassium Salts wherever possible. This presents an economic as well as a hygienic advantage, as the Sodium Salts, in addition to being much cheaper, are also less toxic.

A commercial Bi-sulphite of Soda solution is obtainable locally, which contains 20 per cent. of SO_2. The wholesale price for this at present moment is about 10s. per cwt., a little under 10d. per gallon. It should really be a very economical form, seeing that it costs very little more than the Sulphurous acid solution, which only contains 5 per cent. of SO_2.

Dissolved Sulphurous Acid has, however, been somewhat extensively used in the past, and will, no doubt, continue in use, hence the following particulars concerning it may be given:—

In France the standard or legal solution is one containing 8 per cent. of SO_2. In Melbourne the B.P. (*British Pharmacopœia*) solution is the usual one. This contains 5 per cent. SO_2* and has a specific gravity of 1.025 (3.5 degrees Beaumé). It is worth noting that the percentage in any solution of the gas corresponds almost exactly with the decimal figures in the specific gravity divided by 5.† The French 8 per cent. solution would be thus of specific gravity 1.040, or 5.5 degrees Beaumé. The *British Pharmacopœia* solution is quoted at about 8s. per cwt. wholesale.

The figures the wine-maker will find it convenient to remember in connection with the use of SO_2 are as follow:—

In order to obtain 1 oz. of SO_2 he will require to use—

- ½ oz. Sulphur (burnt).
- 1 oz. SO_2 liquified under pressure.
- 2 ozs. Bi-sulphite of Potash.
- 2 ozs. Anhydrous Sulphite of Sodium.
- 4 ozs. Crystalline Sulphite of Soda.
- 5 ozs. Bi-Sulphite of Soda solution @ 20%.
- 20 ozs. Sulphurous Acid B.P. (S—ous) @ 5%.

* Equivalent to 6.4% expressed as H_2SO_4.
† Squires *Companion to the British Pharmacopœia*.

THE WALNUT.

(Continued from page 473.)

C. F. Cole, Orchard Supervisor.

Grading.

This most important work of grading should not be overlooked by the grower if he wishes to realize the highest market value for his walnuts

Nuts graded with regard to size, colour, and general quality, separately packed and branded with a grade mark, will realize more upon the market than if the nuts are ungraded and sold as a bulk lot. Growers should try to secure the highest ruling prices for their walnuts. To achieve this, grading must be practised, otherwise the purchaser will probably grade and sell at enhanced values. Information gathered by the writer from several growers who do not grade as to prices obtained, shows that they realize 4½d. to 6d. per lb. in bulk, while others, who grade, receive from 6d. to 9d. per lb., according to sample.

The practice of grading is not general in Victoria, and where adopted is not upon systematic lines, chiefly owing to the haphazard method adopted in the past of planting non-selected types. The nuts, consequently, are not of a sufficiently distinctive type to warrant careful grading.

When harvesting nuts, certain varieties of similar form should be kept together as much as possible. Oval, elongated-shaped nuts should be kept separate from those of a broadly oval or rounded form. Plate 30, Fig. B. is an elongated type that should be kept separate and not graded with Plate 30, Fig. A, belonging to a short, rounded type. Both nuts, however, belong to grade No. 1.

Nuts similar, or of a type, have a much better appearance when graded and kept separate, than if mixed with nuts of different form.

Compare nuts illustrated in Plates 30 and 31; some of these will not pass through 1 3-16 square inch mesh if in a horizontal position, but if in a vertical position will do so. These nuts should not be graded together.

Owing to the small quantity of nuts produced in Victoria, grading by hand should be adopted in preference to selling the nuts ungraded. If in the future walnuts are produced in quantity for commercial purposes, grading by machinery or other means must be adopted. In America nuts are graded chiefly over horizontal screens which are shaken backwards and forwards by machinery so that the smaller nuts drop through the various meshes, and all sizes are carried automatically on to belts which elevate them into bins. Grading for quality is done by picking and rejecting discoloured or otherwise objectionable nuts by hand. After carefully inspecting several harvested crops, I would recommend grades as follows:—*Specials.*—These are nuts that will not pass through a 1 3-16 square inch mesh screen. *No. 1 Grade* nuts that

will pass through a 1 3-16 square inch mesh. *No. 2 Grade* nuts that will pass through a 1 2-16, but not through a 1 square inch mesh screen.

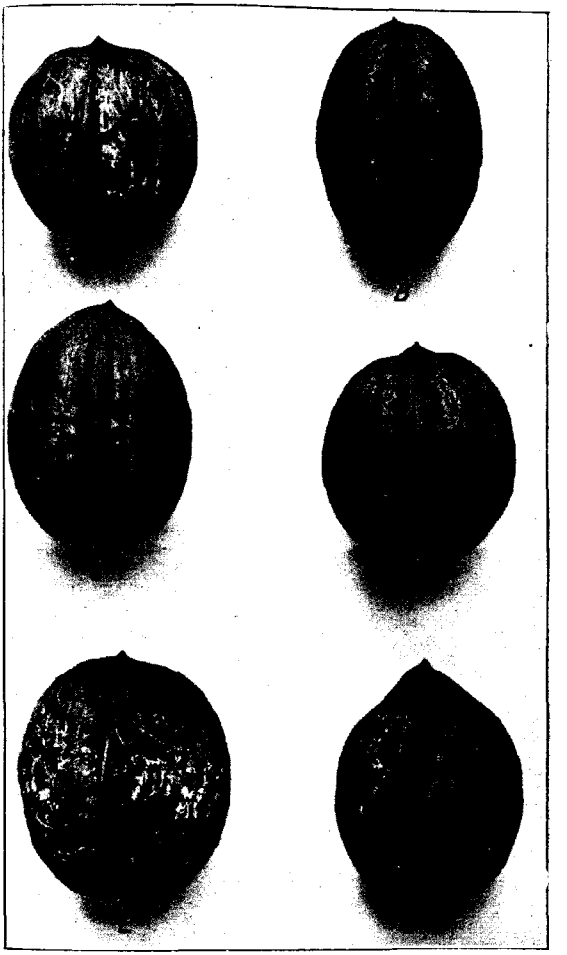


Plate 30.—Various Selected Types of Victorian English Seedling Walnuts, Natural Size.

No. 3 Grade, nuts that will pass through a 1 square inch, but not through a ¾ square inch mesh. Any nuts that pass through the ¾-inch mesh or

other rejects, having fair meat, may be termed culls or smalls, and sold as such to manufacturing confectioners or pastrycooks. Only a low percentage of nuts harvested from selected varieties will reach the No. 3 grade. Therefore, the majority of nuts harvested will grade according to the nuts depicted in Plate 31. Plate 30 shows two grades according to types, Figure E, special grade; the others, A, B, C, D, and F, belong to Grade 1.

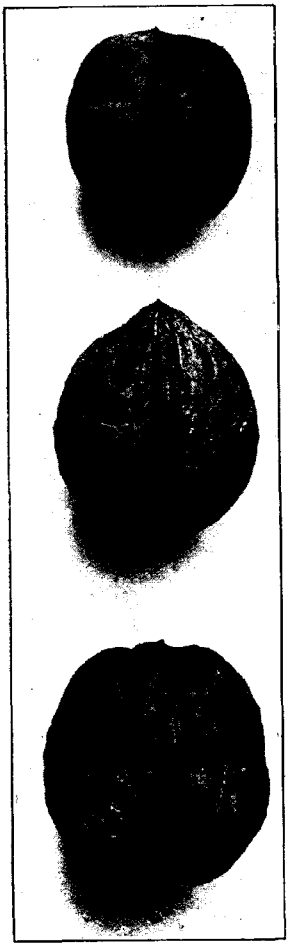


Plate 31.—Graded Nuts.

A. Grade, No. 2.
B. Grade, No. 1.
C. Grade, Special.

The commercial grades of walnuts commonly made in California are as follows: — "Budded." The term "budded," as applied in the trade, includes graded nuts of good appearance and of large size. *No. 1 Soft Shells, No. 2 Soft Shells, No. 1 and No. 2 Standard or Hard Shells, Paper Shells and Culls.* The terms "soft shell," "hard shell," and "paper shell," are of rather uncertain meaning as far as the thickness of the shell is concerned; any nut that is easily cracked or opened is termed a soft shell. In California, all good nuts of desirable size and shape are placed on the market as soft shell, regardless of the actual cracking quality.

Marketing.

After the process of washing, drying, grading, &c., the nuts should be placed in clean corn sacks and carefully sewn up, the grower's name and grade of nut being stencilled upon the sacks. Old or dirty sacks should not be used. Nuts put up in clean sacks, with grade marks, are more attractive and appeal to the buyer.

Nuts not for immediate sale should be stored in a cool, dry place free from rats or other vermin.

Uses.

The matured nuts from this beautiful tree, besides being one of the most attractive of the edible kinds, are highly nutritious, and of value as an article of food. They are extensively used by confectioners.

In their immature (green) state, or when the shell is soft enough to be easily punctured, they make an excellent pickle preserved in vinegar.

An oil may be extracted from the meat of the matured nuts. This oil is used similarly to olive oil, and is preferred by many French cooks. Artists use an oil extracted from walnuts.

Besides the manufacture of dyes and stains, the wood of the English walnut is valued for veneering, and is largely used in general cabinet work.

(To be continued.)

PASTEURIZATION OF MILK.

In order to determine the temperature of milk during lower pasteurization and its efficiency compared with other methods, the following experiment was performed:—

One pint of raw milk at 69 deg. F. (20 deg. C.), contained in the ordinary milk bottle, was put into one gallon of boiling water in a covered tin pan in a room of 75 deg. F. (24 deg. C.).

The cap had been removed from the milk bottle, and the pan was uncovered at the intervals indicated below and a thermometer inserted into the milk for one minute.

Temperature of the Milk.

After	F. Deg.	C. Deg.
10 minutes	174.2	79
20 minutes	181.4	83
30 minutes	177.8	81
40 minutes	174.2	79
70 minutes	161.6	72
100 minutes	150.8	66
120 minutes	145.4	63

	Number of Bacteria per C.C.
In the raw milk	550,000
In the pasteurized milk	400
Efficiency of lower pasteurization ...	99,993 per cent.

The temperature and time in this experiment on lower pasteurization exceeds the amount usually recommended. The heating can be lessened by using a smaller amount of boiling water or by using a larger amount of milk.

Usually a bottle of milk is placed on something to hold it above the bottom of a tin pail or can so as to allow free circulation of water and prevent bumping. Water is filled into the pail until almost on a level with the milk in the bottle. The whole is then heated until a good thermometer inserted therein through a hole in the cap shows a temperature of 145 deg. to 155 deg. F. The bottle or bottles are then removed from the water, a new cap inserted, and after standing 20 to 30 minutes, preferably covered and standing in water at 145 deg. to 150 deg. F., so as to retain the heat more evenly, are rapidly cooled and stored in a cool place.—[Extract from *Pure Products*, May, 1915. Article by Chas. E. Gabel.]

THE PROPAGATION OF CULTURE STARTERS FOR CHEESE-MAKING.

By G. C. Sawers, Cheese Expert.

Many cheese-makers seem not to realize that the starter they employ is a living agent, and that for the best results its vitality or potency must be fully maintained.

Disappointment often results from want of knowledge as to the most favorable conditions for the growth of the starter ferment.

The practical difficulty is to propagate the starter from day to day and preserve it in an active pure condition.

Instead of being successfully propagated for a month, as it might be if more suitable methods were adopted, the lactic ferment, in many cases, in a short time, often in a few days, becomes comparatively dormant, and the starter subsequently alters in character until it is evidently impure.

The original ferment has been obliged to give place to others of a less desirable type.

The method of propagating cultures described below have proved very satisfactory.

There are at least two distinctly different classes of starters—home-made or natural starters, which may be ordinary milk, allowed to sour naturally; and commercial or culture starters, prepared by bacteriological methods in the laboratory. But in all forms of starters, home-made and culture alike, the active principal consists of bacteria germs, or microbes. In home-made starters, there may be present any number of different species of germs, the number of species varying with the origin of the starter and the conditions under which it has been prepared.

The purity of a starter depends upon the number of species of bacteria present, and the purity of a home-made starter which has been originated under ordinary dairying conditions, will be a varying and unknown quantity.

A commercial or culture starter is, on the other hand, procured from a bacteriologist, and should be either a pure culture containing one species of bacterium only, or a culture of two or more species containing only germs especially selected to produce a desirable ripening, and bring about the kind of fermentation which has been found in practice to give the best results.

After thoroughly washing and sterilizing a composite bottle which is marked off in ounces, procure the best milk obtainable, and as fresh as possible.

Put one pint of milk in a clean vessel, and set in clean boiling water, and scald same up to 185 degrees, and maintain that temperature for fully half-an-hour, and give it a stir occasionally with a clean glass rod. Remove the cream that forms on top, and cool the milk to 75 degrees Fahrenheit.

Obtain a bottle of lactic acid ferment powder of a well-known brand, and withdraw the cork and place $\frac{1}{2}$ ounce of powder in the composite

bottle. Replace corks immediately, and seal down the cork of the lactic acid ferment powder bottle with beeswax or paraffin to prevent any germs from getting in, and set away in a cool place protected from direct sun light.

First Propagation.—Remove the cork from the compost bottle and pour the milk in up to No. 6 mark, replace stopper, and shake the contents for a few minutes, so that the powder is thoroughly mixed in the milk. Do this at intervals for the first four hours.

Set the bottle in water at a temperature of 75 degrees Fahr., maintaining even heat from eighteen to twenty-four hours, when the startoline should be nicely thickened for the purpose of starting more fresh pasteurized milk.

Second Propagation.—Discard about 2 ounces from the top, then shake up the contents and pour the remainder into a clean cup, and cover top with clean muslin cloth, then rinse the bottle with cold water, and wash out in hot water with small quantity of soda added, and then sterilize with steam.

Put $\frac{3}{4}$ ounce of the culture from the cup into the compost bottle and add freshly pasteurized milk up to the 6 mark again, after having lowered the temperature to 70 degrees Fahr., and maintain for the same period as for first propagation.

Third Propagation.—An acidimeter test can be taken to ascertain the acidity, which should show .65 per cent. at least.

Repeat the first operations described under second propagation, but retain only $\frac{1}{2}$ ounce to be added to the 6 ounces of pasteurized milk, and cool down to 65 degrees, and keep at about that temperature until the following day. Four ounces of this culture, if clean and mild and smooth, testing .85 per cent. acidity, will be found sufficient to propagate 2 gallons of pasteurized milk at a temperature of 65 to 70 degrees. This is equal to about $1\frac{1}{4}$ per cent. of starter. Portion of this starter may then be retained to carry on operations in the usual manner from day to day, so long as it retains its purity.

All tinware used for scalding the milk and setting the starters should have a smooth well-tinned surface, free from rust, and cloths required for covers should be thoroughly washed out, and rinsed in scalding water, and wrung out. This prevents any dust or flies from getting in. The best way to sterilize the utensils is to boil for twenty minutes in water in which has been dissolved $\frac{1}{2}$ per cent. of washing soda, *i.e.*, about a teaspoonful to a pint, or two tablespoonsful to a gallon.

SUMMER FODDER CROPS.

By Temple A. J. Smith, Chief Field Officer.

Pamphlet free on application to Director of Agriculture, Melbourne.

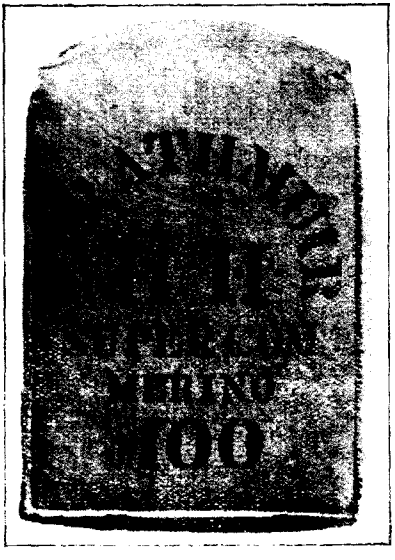
WOOL TERMS.

"Bales," "Butts," "Sewdowns," "Fadges," and "Bags."

By H. W. Ham, Sheep Expert.

Bales.

On farm holdings, or in transit, it is usual for any quantity of wool enclosed in the customary jute woolpack to be termed a bale. But once in store on sale for export one of the rules of the Wool Buyers' Asso-



This bale of wool grown by Mr. R. H. Hinchcliffe, a farmer of Ararat, was selected with the assistance of Messrs. Geo. Hague and Company, Geelong, for exhibition at the Panama Exposition, San Francisco. *It helped to win for Victoria the Gold Medal* against the world's competitors. An offer from one of the American Universities to purchase it at the conclusion of the Exposition will probably be accepted.

ciation demands that "no package shall be considered a bale unless it be contained in a woolpack, be in shipable order, and weigh at least, for greasy wool, 200 lbs. gross."

This rule is comparatively a new one. It has been instituted because of the steadily increasing number of light-weight bales sent in by growers in recent years. For this there are several causes. Growers of high-class wools, more particularly smaller breeders, have learnt that most classes of wool open up more attractively if not too tightly pressed.

Also, that the larger the number of bales in one line, the more attention is given to it, and the better the competition. And, as well, a matter which affected the small grower most, all lots of three bales and under, known as "star lots," are sold in separate sale-rooms, and are bought mainly by buyers' assistants, and thus by making four light bales instead of three of the average weight, a "star lot" was often avoided, and competition in the main sale-room gained.

Buyers had their reasons for complaint also. They receive their orders to purchase in number of bales, and their commission for buying is at per pound. Charges to them from store to ship's side are at per bale. It is, then, from their view, only reasonable that a fair quantity of wool should be in each bale. As well, the increasing number of bales in proportion to the total weight of wool on offer, meant extra time in examination.

Neither should bales be excessively heavy. Greasy wool opens up less attractively when over three and a half hundredweight. Bales of this weight and over, especially cross-bred, apart from being inconvenient to load and stack, are often found so tightly pressed that buyers find a difficulty in drawing from flapped bales sufficient wool to examine well, unless in every case the cap be entirely removed, which, as a rule, means extra re-packing charges to the grower.

One of the best recommendations for the contents of a bale of wool is its outward appearance. All bales should be branded boldly and legibly on the long and narrowest side. This allows of opening the bales by what is known as "flapping," as well as more bales being exhibited side by side on a given floor space. All brands face the passage ways. These, and the weight of each bale, must be placed where readily seen by the buyer when examining. He has to guarantee the "average yield," viz., the weight of clean scoured wool that will be obtained from each order.

The weight of each bale, together with the apparent condition of the small proportion of wool he can examine from each bale, is his main guide.

Branding is more neatly done with stencil-plates and branding ink, the latter can be obtained in either cake or liquid form. Marks put on by hand with sheep branding oil, or paint are most unattractive. In sewing down the cap the "lock stitch" is preferable; if any one stitch becomes broken or cut in transit, the others hold.

Use blue twine, the loose portions, when bales are cut open, are more easily detected. Grey twine portions often pass through all operations, up to the dyeing processes, before being detected.

Patent bale fasteners, peculiar shaped hooks, are used in many cases in place of sewing with twine. Occasionally odd ones escape notice, and pass into the machinery.

The latest method is one in which blue twine stitches take the place of the metal hooks, only six stitches in all being used.

Except for the purpose of checking on large holdings or on trucks, it is not necessary to brand on the ends. Brokers brand on one end on receipt in store for their own convenience in extracting sample bales from owners' stacks as required. One end should always be left clear for buyers' destination marks.

The usual jute pack is sufficient for ordinary wools. Paper-lined packs are only warranted in the case of best "lambs" and all grades of superior fleece.

Butts.

Short, pressed portions of bales, quarter and half-size, usually the final clearing up of the various classes from wool bins at the conclusion of the shearing of large flocks.

Sewdowns.

Woolpacks filled to their extreme length, with bulged sides, the cap pulled over and sewn down all round on top. In many cases also branded carelessly without the use of stencil-plates and proper branding ink. Many buyers will not bid for these. Apart from their awkwardness in stacking and placing for inspection, they create a greater feeling of suspicion as to the faithfulness and evenness of the contents than properly-pressed bales do.

Straw, chaff, fleeces tied with coarse string, binder-twine, &c., fleeces rolled with urine stains and muck balls inside, dead wool with rib-bones intact, have all been found more in sewdowns than in the better-pressed bales.

While unskirted, mixed grades of wool gain little by being in neatly-pressed bales, good, well-prepared wool in sewdowns are at a disadvantage.

Fadges.

This word is used to describe all light-weight bales, no matter how pressed, but more particularly refers to half and three-quarter sized spade-pressed bales. Light-weight sewdowns, usually from small holdings.

Bags

are of all sizes—black fleeces in small sugar bags, quarter and half sacks of locks, stains, &c.; super. and chaff bags, containing rams' fleeces, dead wool, &c.; fleeces from stragglers missed in mustering for shearing.

Under-weight bales, butts, fadges, pockets, and bags are considered by foreign wool buyers as "not in shipable order," and "must be catalogued by themselves at the end of the catalogue, and sold in a separate auction-room."

FLY EXCLUDER FROM MILK OR CREAM CANS.

Mr. H. B. Hooper, Dairy Supervisor to the Kerang Municipal Council, forwards the details of a fly excluder from milk or cream cans.

The article is described "as being about 7 inches high, and of a width equal to the inner surface of a cream can—different sizes for larger or smaller cans. A little above the bottom is a flange to rest on the top of the can. The body portion is cut out of one piece of flat metal, bent to a circle, and the ends joined with open spaces cut out. These are closed by a strip of gauze wire fastened around the inner side, and

giving 3 inches vertical airway. The top is open, and when in use is closed by the lid of the can placed on top."

It would seem that the two main defects in fly excluders seen in the dairies are:—Insufficient play of air above the cream, and the danger of fly-blows or other particles dropping through the horizontally-placed gauze. It is claimed that, by means of the gauze being vertical, the freedom for the movement of air across the top of the can and the protective flange has been attained, and these defects have been overcome

HOME HINTS.

There are many ailments that flesh is heir to which may be quickly relieved or cured by very simple treatment, provided they are attended to in time. Also often the most effective and valuable aids are found in the cheapest material that is nearly always at hand.

Burns and Scalds.—Get threepenny worth of picric acid, place in a wide-necked pickle bottle and fill up with water. So long as there are crystals undissolved keep filling up with water. Swab the part burnt with this picric acid solution. Repeat at intervals until the pain ceases. It is recorded that children that have been badly scalded have been kept in a bath of this material for weeks and recovered.

Sore Throat.—For any form of sore throat a very safe and almost invariably effective treatment is to take as much flower of sulphur as would lay on a threepenny bit and blow into the throat, so that it spreads as far as possible over the whole surface.

For cuts and abrasions apply hazelene and boracic acid.

For sores difficult to heal apply cloths soaked in weak solution of boracic acid (about a teaspoonful to a pint of water).

For Bilious Sickness.—To prevent take a dose of epsom salts, castor oil, or a seidlitz powder on the first indications of an attack. To allay the sickness and prevent vomiting squeeze the juice of half a lemon into half a tumbler of cold water, to which add half a teaspoonful of bicarbonate of soda and drink it. This will nearly always prevent vomiting.

Cold and Influenza.—The first indication of a cold is usually a slight sore throat. A few doses of ammoniated tincture of quinine taken will almost surely prevent further development. Take about 20 drops in a quarter of a tumbler of water two or three times a day. Should the cold settle on the chest rub well with eucalyptus oil. If the patient is a child apply camphorated oil, rub in and on flannel saturated. Camphorated oil is made by shaving up camphor into a bottle of olive oil, in which the camphor will dissolve. The efficacy will be increased by the addition of a little spirit. If a cough should develop take olive oil regularly two or three times a day, half a teaspoonful to a dessert-spoonful.

Croup.—A dose of olive oil is the safest and quickest remedy.

Olive Oil.—Always keep on hand a supply of the best Australian olive oil. There is none better; it is almost tasteless. If there is any difficulty in persuading children to take it when they have colds, keep a little in a saucer mixed with sugar, and they will help themselves.

For corns apply glacial acetic acid once a week. Trim off superfluous skin with scissors. Be careful not to allow the acid to run on to the skin surrounding the corn.

A few drops of methylated spirits and soap on cloth will remove obstinate dirt and stains from the skin.

Lemon juice is excellent for removing vegetable stains from the hands.

Gastritis.—½ oz. bitter aloes, ½ oz. Peruvian bark (ground), 3 ozs. best liquorice, 6 dr. tincture of aniseed, 1 teaspoonful bi-carbonate of soda, as much cayenne pepper as will lay on a sixpence, ½ pint water. Boil for one hour and a half, strain through muslin cloth, and then add aniseed. Take a teaspoonful three times a day, and if painful, take an extra dose at bedtime.

STATE RESEARCH FARM.

At the Werribee Show on 21st October, the exhibits from the State Research Farm were the subject of much complimentary comment, and their high standard may be gathered from the prominence attained in open competition, as shown in the prizes won as under:—

HORSES.

1st Prize—Draught stallion (4 years and over)—Major Oates.
3rd Prize—Draught brood mare (all-aged)—Western Princess.
2nd Prize—Wagon team of five horses.
2nd Prize—Light-weight hackney.
3rd Prize—Ladies' palfrey.

CATTLE.

1st Prize and Champion—Red poll bull—Nicotine.
1st Prize and Champion—Red poll cow—Birdseye.
2nd Prize—Red poll cow.
3rd Prize—Red poll cow.
1st Prize—Fat cow—Goldleaf (red poll).

SHEEP.

1st Prize—Border Leicester ram.
1st Prize—Southdown ram.
2nd Prize—Lincoln ram.
1st Prize—Merino ewe.
1st Prize—Pen of three lambs (freezers).*
2nd Prize—Pen of three lambs (freezers).†
1st Prize—Pen of three fat lambs.
1st Prize—Pen of three sheep (freezers).
2nd Prize—Pen of three sheep (freezers).
1st Prize—Pen of three cross-bred wethers.

GRAIN.

1st Prize—Bag of wheat.
1st Prize—Three sheaves wheaten hay.
1st Prize—Three sheaves oaten hay.
1st Prize—Three bales lucerne hay.

* The first prize pen of lambs suitable for export were by Southdown ram ex first cross Lincoln-Merino ewes.

† The second prize pen of lambs suitable for export were by Shropshire ram ex first cross Lincoln-Merino ewes.

One of the imported Suffolk ewes from the Research Farm was supplied as subject of a guessing competition, and turned the scale at 242 lbs.

A number of non-competitive exhibits were also made, including bundles of lucerne representing the growth on areas subjected to various manurial treatments.

FIFTH VICTORIAN EGG-LAYING COMPETITION, 1915-1916.

Commenced 15th April, 1915; concluding 14th April, 1916.

CONDUCTED AT THE BURNLEY SCHOOL OF HORTICULTURE.

Six Birds. Pen No.	Breeds.	Owner.	Totals. 15.4.15 to 14.9.15	15.9.15 to 14.10.15	Six months.	Position in Competition.
		LIGHT BREEDS. WET MASH.				
21	White Leghorns ..	E. B. Harris	657	146	803	1
38	,, ..	G. McDonnell	648	154	802	2
53	,, ..	W. G. Swift	660	134	794	3
2	,, ..	E. A. Lawson	634	159	793	4
19	,, ..	L. G. Broadbent ..	646	140	786	5
34	,, ..	H. McKenzie and Son ..	625	154	779	6
5	,, ..	J. J. West	638	136	774	7
8	,, ..	C. J. Jackson	610	151	761	8
42	,, ..	W. M. Bayles	603	158	761	
9	,, ..	J. Schwabb	599	139	738	10
7	,, ..	Marville Poultry Farm ..	595	141	736	11
10	,, ..	A. E. Tuttleby	606	124	730	12
6	,, ..	F. Doldissen	597	133	730	
26	,, ..	A. Mowatt	585	135	720	14
44	,, ..	Mrs. F. M. Oliver ..	576	141	717	15
16	,, ..	N. Burston	585	128	713	16
30	,, ..	A. E. Silbereisen ..	552	151	703	17
4	,, ..	R. Hay	556	144	700	18
39	,, ..	W. M. Sewell	548	151	699	19
32	,, ..	F. Hodges	552	142	694	20
1	,, ..	Mrs. H. Stevenson ..	543	147	690	21
18	,, ..	*D. Adams*	567	121	688	22
50	,, ..	John Hood	533	150	683	23
3	,, ..	J. H. Gill	527	154	681	24
54	,, ..	W. G. Clingin	527	152	679	25
11	,, ..	J. B. Brigden	531	145	676	26
59	,, ..	W. G. Osburne	522	152	674	27
60	,, ..	*H. C. Brock*	550	124	674	
49	,, ..	Bennett and Chapman ..	519	151	670	29
28	,, ..	R. Lethbridge	511	158	669	30
23	,, ..	Fulham Park	508	161	669	
25	,, (5 birds)	Giddy and Son	533	134	667	32
13	,, ..	T. Hustler	512	151	663	33
24	,, ..	Lysbeth Poultry Farm ..	526	136	662	34
33	,, (5 birds)	A. W. Hall	512	135	647	35
15	,, ..	H. N. H. Mirams ..	497	137	634	36
55	,, ..	W. N. O'Mullane ..	493	140	633	37
48	,, ..	C. J. Beatty	507	120	627	38
20	,, ..	R. W. Pope	465	150	615	39
47	,, ..	J. C. Armstrong ..	468	138	606	40
27	,, ..	J. A. Stahl	459	147	606	
43	,, ..	H. I. Merrick	451	152	603	42
12	,, ..	G. Hayman	446	145	591	43
57	,, ..	B. Mitchell	478	111	589	44
52	,, ..	A. A. Sandland	467	122	589	
58	,, ..	*Thirkell* and Smith ..	444	144	588	46
22	,, ..	S. Buscumb	429	151	580	47
41	,, ..	J. A. Donaldson ..	441	138	579	48
46	,, ..	R. Berry	430	147	577	49
45	,, ..	South Yan Yean Poultry Farm	439	135	574	50
36	,, ..	Weldon Poultry Yards ..	432	141	573	51
40	,, ..	C. C. Dunn	428	132	560	52
37	,, ..	A. Ross	399	126	525	53
14	,, ..	W. Flood	378	117	495	54
56	,, (5 birds)	C. Hurst	372	107	479	55
31	,, ..	L. McLean	321	134	455	56
		Total	29,237	7,866	37,103	

FIFTH VICTORIAN EGG-LAYING COMPETITION, 1915–16— *continued.*

Six Birds. Pen No.	Breeds.	Owner.	Totals. 15.4.15 to 14.9.15.	Totals. 15 9 15 to 14.10.15	Totals. Six months.	Position in Competition.
		LIGHT BREEDS.				
		DRY MASH.				
80	White Leghorns ..	W. H. Robbins	713	152	865	1
68	,, ..	H. McKenzie and Son ..	574	166	740	2
64	,, ..	W. M. Bayles	554	143	697	3
69	,, ..	E. MacBrown	573	120	693	4
79	,, ..	Lysbeth Poultry Farm ..	541	151	692	5
78	,, ..	H. Hanbury	556	131	687	6
66	,, ..	E. A. Lawson	523	143	666	7
67	,, ..	A. H. Padman	507	155	662	8
72	,, ..	Mrs. E. Zimmermann ..	530	131	661	9
76	,, ..	A. A. Sandland	503	149	652	10
62	,, ..	Benwerrin Egg Farm ..	463	160	623	11
61	,, ..	Mrs. H. Stevenson ..	458	164	622	12
65	,, ..	Thirkell and Smith ..	474	145	619	13
87	,, ..	C. C. Dunn	453	142	595	14
71	,, ..	Moritz Bros.	448	144	592	15
77	,, ..	South Yan Yean Poultry Farm	359	150	509	16
73	,, ..	C. L. Lindrea	353	150	503	17
74	,, ..	J. H. Gill	347	117	464	18
75	,, (5 birds)	Fulham Park	328	123	451	19
		Total	9,257	2,736	11,993	
		HEAVY BREEDS.				
		WET MASH.				
97	Black Orpingtons ..	Marville Poultry Farm ..	663	142	805	1
86	,, ..	C. E. Graham	649	152	801	2
100	,, (5 birds)	J. H. Wright	658	118	776	3
81	,, ..	Mrs. T. W. Pearce ..	644	125	769	4
85	,, ..	H. H. Pump	592	123	715	5
89	Rhode Island Reds	E. W. Hippe	562	131	693	6
88	Black Orpingtons ..	J. McAllan	570	120	690	7
90	,, (5 birds)	*Oaklands Poultry Farm* ..	576	112	688	8
93	,, ..	L. W. Barker	545	140	685	9
94	,, (5 birds)	D. Fisher	567	96	663	10
99	,, ..	L. McLean	529	115	644	11
87	,, ..	W. C. Spencer	523	118	641	12
91	,, ..	A. Greenhalgh	490	146	636	13
84	,, ..	Cowan Bros.	483	131	614	14
92	,, ..	J. Ogden	453	156	609	15
95	Silver Wyandottes ..	W. H. Forsyth	474	109	583	16
96	White Orpingtons ..	Stranks Bros.	430	80	510	17
83	Black Orpingtons ..	G. Mayberry	386	124	510	
98	Faverolles ..	K. Courtenay	360	150	510	
82	White Wyandottes	J. B. Brigden	232	110	342	20
		Total	10,386	2,498	12,884	

Report.

Weather conditions this month were again very changeable. North-west winds were very prevalent with a good deal of rain and some frosts. Temperatures ranged from 32° to 86° Fah. The lay for the month has averaged slightly better than 32 eggs per pen per week, which is probably a record for a like number of birds. The scores put up by some pens are very interesting at this date, being the end of the half-year. Pen 80 (dry mash), owned by Mr. W. H. Robbins, with 865 eggs, is seven ahead of the leading pen of the last competition at the same date, and the birds are looking hard and fit after their strenuous work. In the heavy breeds Marville Poultry Farm's pen, with

805, is sixteen eggs ahead of the leading score last year, and Mr. C. E. Graham's, with 801, is twelve ahead. In the wet mash Leghorns Mr. E. B. Harris leads Mr. G. McDonnell's pen by one egg. Mr. W. G. Swift's pen, although the birds are looking quite fit, has eased off temporarily. The pens of Messrs. Lawson, Bayles, Broadbent, West, McKenzie, and others are close up. The competition looks very open indeed, as a fast run by any of these pens may alter things materially. The health of the birds is all that could be desired. With the advent of warmer weather the birds can now enjoy a plentiful supply of freshly-cut lucerne and white clover. These legumes, supplying as they do a liberal nitrogenous content, in addition to their corrective qualities, are particularly useful, and effect a material saving in the feed bill in addition to their health-giving qualities. Rainfall for month, 217 points.

The eggs are this year being sold at 1d. a dozen over the top price quoted in the *Age* and *Argus*. The average price for the first six months' laying works out at 1s. 9½d. per dozen, and the yield from Mr. Robbins' pen is therefore £6 9s. 1¾d.—a return of just over 21s. 6d. a bird for six months, which again demonstrates the remunerative nature of the poultry industry.

The returns from the three leading pens in each section are as follows:—

LIGHT BREEDS.—WET MASH.

	Eggs Laid.	Market Value.
E. B. Harris	803	£5 19 10½
G. McDonnell	802	5 19 9
W. G. Swift	794	5 13 9½

LIGHT BREEDS.—DRY MASH.

W. H. Robbins .. .	865	£6 9 1¾
H. McKenzie and Son ..	740	5 7 11
W. M. Bayles	697	5 1 7¾

HEAVY BREEDS.—WET MASH.

Marville Poultry Farm ..	805	£6 0 2½
C. E. Graham	801	5 19 7
S. H. Wright	776	5 11 9

Department of Agriculture,
Melbourne, Victoria.

A. HART,
Chief Poultry Expert.

VICTORIAN RAINFALL.

Third Quarter, Year 1915.

A perusal of the table given below of the rainfall in Victoria will show that most of the State, in July, had falls exceeding the average, the chief exception being the Gippsland Division and the Volcanic Plains in the west. These rains, following on those of the previous good month, were of an extremely welcome character, accompanied, as they were, by warm temperatures and very few frosty nights. Thus conditions could hardly be better for the agriculturist. As three huge Antarctic depressions operated during the period, the distribution

extended over the greater portion of the month, with intervals of fine, bright sunshine, from the 15th to 18th, and again from 26th to 29th. August was a month of splendid rains, even more beneficial than its predecessor, in the fact that a greater area of the State had abundant rains; and even where the totals did not came up to averages, the departures were small. As temperatures were mostly mild, and the weather favorable, hopeful prospects were well maintained. The rains were again mainly due to the influence of Antarctic depressions, and some cold periods were experienced. Another prosperous month for the man on the land occurred in September, rains throughout being above the averages if the East Central, and a small part of East Gippsland be excepted. Temperatures were again extremely mild, and all the conditions that could be desired for the promotion of agricultural and pastoral industries were existent. Thus the winter rains were extremely beneficial, and highly satisfactory. Floods were experienced over the drainage areas of the Wimmera and Avoca Rivers, and, to a lesser extent, on the Glenelg.

Crops throughout are extremely healthy and strong, and growth in some cases phenomenal Abundance of pastures, more than sufficient for requirements, owing partly to the depletion in stock caused by the previous drought, but mainly through the extremely favorable rains, prevails throughout, and northern areas especially have benefited considerably. Stock are mostly in excellent condition, though in some parts of East Gippsland they are somewhat poor, but recovering condition consequent on the September rains, and the growth in grass experienced thereby.

District.	——	July.	August.	September	Quarter.
		Points.	Points.	Points.	Points.
Mallee North	District Mean.. ..	126	96	261	483
	Normal	78	109	100	287
	Per cent. departure from normal	+62	−12	+161	+68
Mallee South	District Mean.. ..	142	184	310	636
	Normal	116	125	131	372
	Per cent. departure from normal	+34	+47	+137	+71
North Wimmera ..	District Mean.. ..	178	251	405	834
	Normal	157	170	165	492
	Per cent. departure from normal	+13	+48	+145	+70
South Wimmera ..	District Mean.. ..	185	323	472	980
	Normal	203	210	210	623
	Per cent. departure from normal	−9	+54	+125	+57
Lower Northern County	District Mean.. ..	172	195	286	653
	Normal	142	158	141	441
	Per cent. departure from normal	+21	+23	+103	+48

VICTORIAN RAINFALL—*continued.*

District.	——	July.	August.	September.	Quarter.
		Points.	Points.	Points.	Points.
Upper Northern Country	District Mean.. ..	211	267	345	823
	Normal	188	201	182	571
	Per cent. departure from normal	+12	+33	+90	+44
Lower North-East ..	District Mean.. ..	331	427	357	1,115
	Normal	282	249	255	786
	Per cent. departure from normal	+17	+71	+40	+42
Upper North-East ..	District Mean.. ..	400	700	604	1,704
	Normal	457	430	421	1,308
	Per cent. departure from normal	−12	+63	+43	+30
East Gippsland ..	District Mean.. ..	80	203	278	561
	Normal	239	208	275	722
	Per cent. departure from normal	−67	−2	+1	−22
West Gippsland ..	District Mean.. ..	126	377	332	835
	Normal	285	300	342	927
	Per cent. departure from normal	−56	+26	−3	−10
East Central	District Mean.. ..	191	361	289	841
	Normal	295	286	335	916
	Per cent. departure from normal	−35	+26	−14	−8
West Central	District Mean.. ..	163	186	258	607
	Normal	179	185	227	591
	Per cent. departure from normal	−9	+1	+14	+3
North Central ..	District Mean.. ..	273	367	407	1,047
	Normal	255	251	260	766
	Per cent. departure from normal	+7	+46	+57	+37
Volcanic Plains ..	District Mean ..	178	302	419	899
	Normal	236	241	281	758
	Per cent. departure from normal	−25	+25	+49	+19
West Coast	District Mean.. ..	322	438	486	1,246
	Normal	344	318	323	985
	Per cent. departure from normal	−6	+38	+50	+26

N.B.—100 points = 1 inch.

12th October, 1915.

H. A. HUNT,
Commonwealth Meteorologist.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Principal, School of Horticulture, Burnley.

The Orchard.

Pests.

As a preventive against codlin moth the trees should be kept well sprayed with arsenate of lead. It has been definitely ascertained that this is the best remedy, and all other mixtures should be discarded in its favour. Its permanent qualities, combined with an effective killing strength, render this mixture invaluable; at the same time, it is easily mixed, and so very few brands leave any sediment that the work of spraying is now reduced to a minimum.

If the spraying is careful and thorough, no bandaging need be carried out. The time spent in bandaging would be better employed in an extra spraying. The first spraying should be given at the time of the falling of the petals; the second spraying, owing to the rapid expansion of the fruit, should be given a fortnight later. After that, the grower must use his own judgment as to the necessity for subsequent spraying. If the moths be at all prevalent other sprayings will be quickly necessary.

For the cherry slug, arsenate of lead may be used, except where the cherries are approaching ripeness; hellebore, lime, or tobacco water should then be used.

The work of cultivation, ploughing and harrowing should be completed immediately. It is always advisable to have the ground well tilled before the dry weather sets in.

All crops for green manure should now be under cover; and if the orchard soil is at all heavy and sticky, the grower should make up his mind to grow a cover crop next season, in order that this condition may be reduced.

The orchard should be kept free from weeds, not only for the conservation of moisture, but to do away with all hiding places of the Rutherglen fly, cut-worm moths, &c.

General Work.

Grafted and newly planted trees should be frequently examined, and given an occasional watering and overhead spraying to encourage their growth, and to prevent loss of moisture from the foliage. It is also advisable to mulch young trees with a light grass or straw mulching, not too rich in animal manure.

The disbudding of unnecessary shoots, and the pinching back or stopping of growths, to prevent them from being unduly prolonged, may now be carried out. This work is particularly important on young trees. Graft ties should be examined, and the ties cut wherever any growth is being made. When the grafts are likely to make any long growth, they should be well staked and tied.

Citrus trees may be planted out, watering and mulching them after planting.

The Vegetable Garden.

Celery may now be sown for winter crops. French beans should be largely sown. Cucumber, melon, and pumpkin, and all seeds of this

family may now be sown in the open. Where these plants are already growing, the longest and strongest runners should be pinched back to throw the strength into the flowering and lateral growths. Watch these plants for mildew, and use sulphur freely wherever present, especially on young plants.

Peas, lettuce, radish, and turnips, cabbage and sweet corn seeds may be sown this month. Seedlings from former sowings may be planted out, and it may be well to dip the whole plant in water before planting. This greatly assists the young plant while taking hold of the soil in its new location.

Frequent waterings and frequent cultivation will now be necessary, and all weeds must be hoed or hand-weeded out; mulching with stable manure will greatly assist the plants.

A few beds should now be deeply worked, adding a liberal dressing of stable manure. The plots will then be ready for the celery, cabbage, and other seeds planted during the month.

Tomato plants will now require constant attention, watering, staking, and thinning, and pinching back of the laterals.

The Flower Garden.

Hoeing, surface cultivation, watering and mulching are the principal necessities for the flower garden this month. One hoeing is worth half-a-dozen waterings. Keeping the soil surface loose and providing an earth mulch for the plants, is far more beneficial, and far less weakening than excessive waterings, to which the garden plants are so frequently subjected in summer. It is safe to say that a greater number of plants are lost in summer through excessive waterings than through the absence of water. Further, the light sprinklings which are so frequently given in hot weather rarely reach the roots of the plant, and only serve to cake and harden the soil, resulting in a further loss of moisture by capillary attraction.

If not already planted out, all bedding and foliage plants should now be in their places in the garden—included amongst these are begonias, salvias, alternantheras, iresines, &c.—while annuals for autumn flowering should now be sown.

All bulbs, corms, and tubers that have ripened their foliage may be removed from the beds, after the foliage has died, and stored in a cool place till next season. Precautions should be taken against damp, which will cause the bulbs to decay.

Herbaceous plants, such as perennial phlox, delphiniums, campanula, as well as gladioli, will all be benefited considerably by liberal waterings of liquid manure, or by mulching with well rotted manure. Whenever necessary, these should all be staked.

Dahlias and chrysanthemums for early flowers should now be planted.

A New Rose Disease.

For some three or four years rosarians have been troubled with a die-back on the rose bushes. The leaves shrivel, turn black, and drop off, then the shoot dies right back to the main growth, this growth afterwards gradually dying as well. Until this year the disease has not been very prevalent, and it was thought, in the gardens where a few roses were attacked, that probably soil or manurial trouble was responsible for the disease. As, however, it assumed serious proportions this

season, the disease was brought under the notice of the Government Vegetable Pathologist, Mr. C. C. Brittlebank, who has determined the presence of an unknown bacteria in very large numbers. Not only has the bacteria been found in the diseased part, but wherever the plant has been punctured by the rose aphis, the bacteria are present in large numbers. It is not possible to give very much information regarding this trouble at present, as it is still being investigated; but, in view of the fact that rose-growers will shortly be considering the summer pruning of their roses, it is thought advisable to give one or two recommendations with a view to keeping the disease in check as much as possible. It may be spread by the aphis, and also through the medium of the secateurs, or any other pruning instrument. So that, in order to cope with the disease, the aphis-infected plants should be sprayed rather more than usual in order to eradicate the pest. Then the pruning implement should be dipped in a strong solution of formalin, especially where they have been used to prune any infected plants. The prunings should be burnt with as much speed as possible, and if these means are taken, the spread of this serious trouble for the present season will be minimized.

WAR LOSSES.

The press telegrams report the death of Leon Pellet, the noted French sugar scientist, whose works have been on the tongue of every progressive sugar manufacturer. Mr. Pellet was killed in action while serving with the French Army. When the war broke out he responded to the country's call, was promoted shortly to the rank of colour-sergeant, then to sergeant-major, and shortly before he was killed he was promoted to sub-lieutenant. Deceased was born in Paris in 1878, and received his scientific education at Lycee Michelet, near Paris, and was appointed chief of chemists to the Pont d'Ardres Sucerie. He was also connected with the Sociéte Generale des Suceries at Raffineries d'Egypte, where he acquired exceptional experiences in the manufacture of cane sugar. Subsequently he was engaged by Mr. Kestner, at Lille, where he added laurels to his researches. He was an indefatigable worker, had exceptional intellectual facilities to hound down any subject, and that with extraordinary ability, to co-ordinate facts and correlate them to the great fundamentals of sugar manufacture. The list of books and articles that were the output of his fertile brain is too long to mention, but they covered principally the chemical and engineering end of the sugar industry. His passing away is indicative of the pathetic feature of the war in Europe, for such men are particular gifts to the world that cannot be replaced like guns, cannon, or even lands and houses.—*The Louisiana Planter and Sugar Manufacturer.*

REMINDERS FOR DECEMBER.

Live Stock.

Horses.—*Stabled Horses.*—Over-stimulating and fattening foods should be avoided. Give water at frequent intervals. Rub down on coming into the stables overheated. Supply a ration of greenstuff, if available, to all horses, or bran mash once a week with 3 or 4 packets of Epsom salts. *Brood Mares.*—Those with foals at foot should be well fed. *Early Foals* may, with advantage, be given oats to the extent of 1 lb. for each month of age daily. Examine the

region of the jaws, neck and forelegs for eggs or nits of bot-flies. If present destroy by running a singeing lamp lightly and rapidly over the affected regions.

CATTLE.—Provide succulent fodder and plenty of clean water and shade. Limewash the cowbails, it helps to keep down flies. Provide "lick" in trough, consisting of salt 20 lbs., bone meal 20 lbs., and sulphate of iron, ½ lb. Look out for milk fever. Read up method of treatment in *Year-Book of Agriculture*, June, 1905. Have cows tested for butter-fat and weighed. Rear heifer calves from cows giving satisfactory results. Continue giving milk at blood heat to calves. Be careful to keep utensils clean, or diarrhœa will result. Do not give too much milk at a time for the same reason. Give half-a-cup of limewater in the milk to each calf. Let them have a good grass run or lucerne, or ½ lb. crushed oats each per day in trough. Dehorn all dairy calves, except those required for stud or show purposes.

PIGS.—*Sows.*—Supply those farrowing with plenty of short bedding in well-ventilated sties. Those with litters old enough may be turned into grass run. *All* pigs should be given a plentiful supply of clean water. Read articles on breeding and feeding in *Journals* for April, 1912, June, 1913, and May, 1915. Pig raising and fattening with present price of pollard and bacon should be highly profitable.

SHEEP.—Mate all ewes procurable at as early a date as possible. Allow rams to remain with the ewes seven weeks, this period admitting of any ewes coming in season the second time. It is rarely necessary to join more than 3 per cent. of 2 tooths, 3 per cent. of 5 and 6 year olds, or 2 per cent. of 2, 3 and 4 year old rams, unless with young ewes. If conditions justify it, 3 and 4 per cent. of vigorous matured rams with aged coarse crossbred ewes will bring an increased number of twin lambs. Clear wool and burrs from about the pizzles of rams, and cut hoofs into shape before mating. Ewes should be of one breed or as near one cross as possible to ensure an even and rapid dropping. Merino and fine cross ewes are in season earliest, first cross or half-breds later, and all ewes with a preponderance of British blood later still. Ewes carry their lambs, four months, four weeks, four days, or roughly, five months.

POULTRY.—Add a little pearneal to morning mash and give less bran. Feed equal parts wheat and heavy oats at night. Supply plenty of green food—at this time, lettuce is invaluable. Discontinue salts and condiments. Avoid salt meat of any description. Put Douglas mixture in drinking water when required. Keep ample supplies of sand, ashes, &c., in pens, and moisten same. This will enable the birds to keep themselves cool and clean. Top off geese, ducks, and cockerels for the Christmas markets. Hens will do better this month by having free range. Remove all male birds from flocks, as infertile eggs will keep longer and command a higher price.

Cultivation.

FARM.—Cut hay in late districts. Cut oats and barley in early places. Finish planting potatoes. Put in late maize for fodder, also millet and imphee. Plough fire-breaks where required. Get stackyard and stages ready for hay.

ORCHARD.—Keep the surface loose and free. Suppress weeds. Spray as often as necessary for codlin moth and pear slug. Mulch and spray young trees and grafts with water in the early morning during hot weather.

VEGETABLE GARDEN.—Keep the surface hoed, and allow the plants plenty of moisture. Stake, pinch out, manure, and water tomatoes. Pinch back long runners of pumpkin and melon family. Sow autumn and winter varieties of cabbage and cauliflower. Plant out seedlings in cool weather. Sow French beans. Cease cutting asparagus beds, and top-dress with manure.

FLOWER GARDEN.—Plant out dahlias and gladioli for autumn blooming. Lift and store spring flowering bulbs. Stake, tie, and train growing plants. Sow zinnias and asters. Layer carnations, camelias, daphnes, &c. Water well and keep the surface loose. Keep rose beds fairly dry.

VINEYARD.—Inspect young grafted vines (field or bench) and carefully remove any scion roots. Tie up young vines. Beware of cut worms on young vines—See *Journals* for July, 1911, and September, 1913. Tying up of bearing vines, if practised, should be completed early in month. Avoid excessive and indiscriminate topping, far too frequent in Victoria. Scarify, if soil is not sufficiently loose, and after heavy rain. Look out for oidium and repeat sulphurings on first appearance of disease.

Cellar.—Fill up regularly and keep cellars as cool as possible.